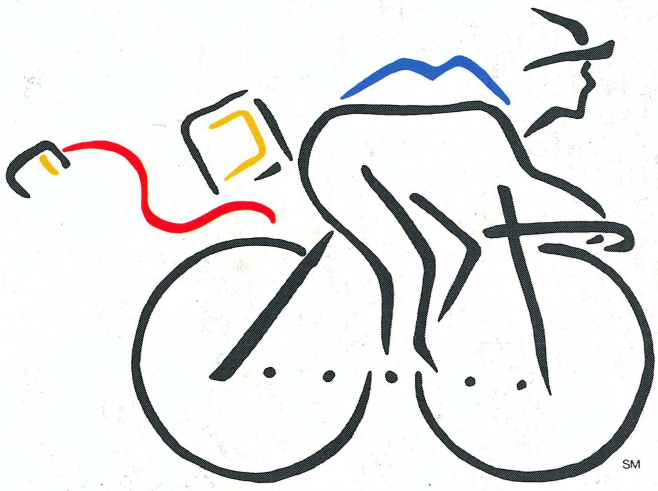
FALL 1986

Vol.2 No.4
Four Dollars

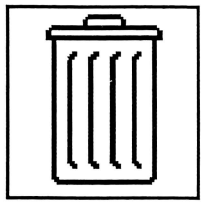
# WHEELS FOR THE MIND

An
Apple University
Publication
Prepared at
Boston College



# WHEELS FOR THE MIND

# Editorial



Hello once again. Welcome to fall!

With this issue, *Wheels for the Mind* has undergone a slight modification: the "look" is a bit different. The change is intended to make it easier for you to locate and read items (as well as to make the publication more attractive).

The theme of this issue is "Curriculum Solutions"—the creative use of the Apple® Macintosh™ personal computer in writing and composition. The sections in this issue include **Focus** (which will highlight topics related to the issue's theme), **Spotlight, Product Features, News and Notes, Technical Information, Resources,** and **Project Reports.**

Please pay special attention to the **Technical Information** section, because it contains information about your Macintosh System software.

In addition, be sure to read about the exciting Academic Achievement Awards competition announced by Apple Computer, Inc.

If you wish to send along an article, project status report, or other submission, forward it to:

**Peter Olivieri** **BITNET: OLIVIERI@BCVAX3**
**Wheels for the Mind**
**Computer Sciences F430**
**Boston College**
**Chestnut Hill, MA 02167**

**AppleLink Address: A0130**

**Please try to send a disk with your words of wisdom, articles, applications, experiences, or software. Screen dumps are great, and you are encouraged to include them.** All disks will be returned. Of course, you can also send along written material if you like. It's just that disks are easier to handle at this end. The success of this publication depends a lot on the participation and support of all of you. Please contribute: Don't wait for someone else—do it yourself.

Until next time, take care.

# *Wheels for the Mind*

| | |
|---|---|
| Editor: | Peter Olivieri |
| Copy Editor: | Anne Kaplan-Neher |
| Contributors: | Beth Ann Moore<br>Kevin Olivieri |
| Production: | Ron Fernandez |
| Coordinators: | Lori Schieferstein<br>Bob Olliver |

*Wheels for the Mind* is prepared on a Macintosh computer using Aldus PageMaker, and printed out on an Apple LaserWriter printer.

An Apple University publication prepared at Boston College. Published quarterly.

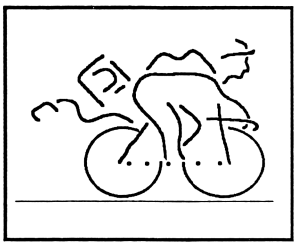

© 1986 Apple Computer, Inc.

Apple, the Apple logo, AppleTalk, and LaserWriter are registered trademarks of Apple Computer, Inc. AppleLine, ImageWriter, MacDraw, Macintosh, MacPaint, MacProject, MacTerminal, MacWorks, MacWrite, and Switcher are trademarks of Apple Computer, Inc. The Wheels for the Mind logo and MacFest are service marks of Apple Computer, Inc. Helvetica, Palatino, and Times are registered trademarks of Allied Corporation. ITC Avant Garde, Gothic, ITC Bookman, ITC Zapf Chancery, and ITC Zapf Dingbats are registered trademarks of International Typeface Corporation. PageMaker is a registered trademark of Aldus Corporation. PostScript is a registered trademark of Adobe Systems, Inc.

Mention in *Wheels for the Mind* does not constitute an endorsement by Apple Computer. Pricing and availability of third-party products is given according to information received and is subject to change.

# Table of Contents

Fall 1986




**Focus** 1
- Writing Tools 1
- Acta 3
- Computer Writing Resource Kit 4
- The Learning Tool 6
- PROSE 8
- ThinkTank 512 10
- Tools for Writers 12
- MacProof 16

**Spotlight** 19
- PROSE (Cornell University) 19
- Drake University English Program 21
- Oakland University 21
- Lewis & Clark College Writing Project 22
- Macintosh in Sports Information 24
- Purdue Executive Master's Program in Management 26
- Macintosh Activities at Colleges and Universities 30
- Washington College CAPHE Awards 39
- The Art of Understanding Data 42

**Macintosh Products** 51
- MicroGrade: Grade Keeping on the Macintosh 51
- MicroTest II: Computerized Test Generation 54

**News and Notes** 57
- Wheels for the Mind Competition 57
- Macintosh in the Health Sciences 59

**Technical Information** 67
- Macintosh System Software 67
- Possible Configurations 69
- Understanding and Upgrading Your System and Finder 70
- Upgrading System Files: A Caution for Network Users 77

**Resources** 81
- Macintosh Books 81
- Articles of Interest 83
  - Business 83
    - Accounting 83
    - Taxes 84
    - Miscellaneous Business 84

# Table of Contents

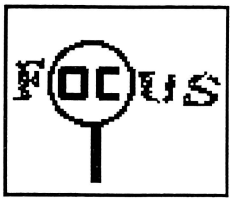

Desktop Publishing 85
Business Related Articles 85
Computer Languages 86
Programs in BASIC 86
Pascal 87
Miscellaneous Articles on Computer Languages 87
Data Bases 88
Microsoft File 88
Filevision 88
FactFinder 88
OverVUE 89
Helix 89
Omnis 89
MacLion 89
Desk Accessories 90
Education 90
Games 90
Graphic Design 92
Miscellaneous Items on Graphics 93
Hardware 94
Hard Disks 94
Miscellaneous Hardware 95
Miscellaneous 95
Music 96
Spreadsheets 97
Telecommunications 98
Utilities 99
Word Processing 100
Miscellaneous 102
Fonts 102

**Project Reports 103**
Astronomy 104
Biology 104
Chemistry 110
Computer Science 116
Design 121
Economics 122
Education 122
Engineering 130
Fonts 137
Geography 140
Geology 140
Humanities 142
Languages 147
Management 150
Math and Statistics 153
Medicine 159
Miscellaneous 162
Music 167
Networks 169

Nutrition and Food Science 175
Philosophy 175
Physics 176
Psychology 181
Sociology 183
Telecommunications 183
Word Processing 186

**The Wheels for the Mind Competition 189**

# Focus




The **Focus** section will concentrate on a different theme in each *Wheels for the Mind* issue. The focus for this issue will be on using the Macintosh in your writing activities. Among the applications that will be discussed are outline processors, idea generators, study aids, and tools for better writing. Please send along information on any applications that you feel deserve special attention from those in the academic community.

## Writing Tools

It seems that one of the comments we hear most often is the following: "We want our students to develop excellent writing skills. By learning to write properly, not only do students learn to express themselves clearly, but they also develop their problem-solving, creative, and critical-thinking abilities. All of these skills are critical to students' success in life after college, no matter what their chosen field. How can we use the emerging computer technology to teach writing more effectively?"

Students often struggle with learning to write. Limited experience with written expression and underdeveloped critical-thinking abilities often combine to make trying to write difficult. This difficulty is compounded by the inflexibility of handwritten and typed drafts, which discourages experimentation. Given all this, is it any wonder that many students despise writing class? But computers can change the situation.

As Dr. Joan Mitchell of the English department at the University of California at Santa Barbara puts it:

> "The computer is not just a fancy typewriter, but a completely new tool for writing. It goes far beyond offering superb editing capabilities; it encourages new kinds of creativity, engenders new attitudes toward writing, and instills new pride in the finished work. When these general attributes are combined with the special ones on the Macintosh—extreme ease of use, a simple word-processing program, imaginative graphics, and the typography of a personal printing press—the English instructor can teach writing in new and far more effective ways."

***"The computer is not just a fancy typewriter, but a completely new tool for writing."***

The software solutions shown here cover a variety of approaches to

writing instruction. They offer tremendous flexibility because, in many cases, students can continue to use these tools in other aspects of their studies, long after they have finished their writing courses. So they continue to refine their writing skills all the way through school.

*Using the Macintosh lets you focus on teaching writing, not computing.*

Using Macintosh lets you focus on teaching writing, not computing.The computer acts as a patient, cooperative partner, encouraging students to brainstorm, capture ideas, organize and develop their thoughts, and painlessly revise and rerevise. And when students' attitudes toward writing improve, they are well on their way to learning to be good writers.

There are numerous Macintosh tools that can help teach students to love writing. But remember, these are just tools. And no tools—no matter how good—will ever replace good thought on the part of the student and enlightened criticism from the instructor. Computer tools cannot make bad writing good, nor can they replace the instructor.

This section covers several kinds of tools:

- **Prewriting tools** either pose thought-provoking questions and give students exercises for breaking writer's block, or provide "thought-processing" aids that can help students organize their ideas into outlines or "concept maps."

- **Analysis tools** provide students with feedback on grammar and diction; use of articles, passive voice, offensive/sexist/racist expressions, subordination, punctuation, and so forth. These tools can be used to screen papers before they are turned in so that instructors can spend more time helping students with content and style rather than correcting errors. This sort of objective feedback from the computer may be easier for a student to take than the feedback from an instructor's red pen.

- Another recent release is a **unique editing tool** that lets instructors or peer reviewers electronically attach comments, editing marks, and requests for revision without altering the students' paper in any way. The program then guides the students through the process of revising their papers.

*Of course, a good word-processing program is an essential element of any writing course.*

Of course, a good word-processing program is an essential element of any writing course. Although not covered in depth here, there are numerous word processors for the Macintosh in a variety of price ranges and performance levels, including MacWrite™, Microsoft Word, and HabaWord.

The following is a sampling (with brief descriptions) of writing tools that can be combined in many ways to fit different curriculum needs. These tools were selected because they are used extensively at campuses around the country. They require little or no training, and some are distributed at very low prices through Kinko's Academic Courseware Exchange. Remember, this list is by no means comprehensive; there are more programs currently available and many more in development.

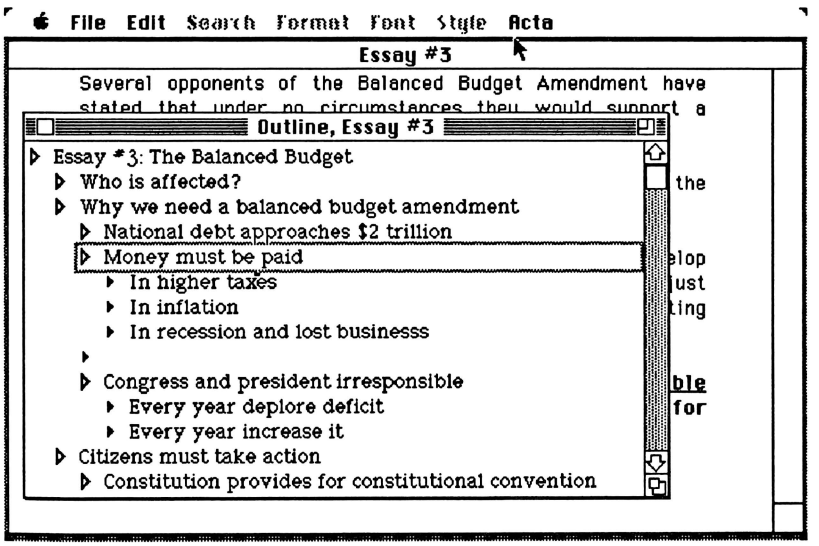
**Acta**
Symmetry Corporation
761 East University Drive
Mesa, AZ 85203
800-624-2485
800-844-2199 in Arizona

Acta is a powerful prewriting tool that functions as a desk accessory. It allows the user to create and work with outlines while using another writing tool, such as MacWrite or Microsoft Word, and to save the outlines in those formats. Graphics may be added and a utility program is included to convert ThinkTank documents to Acta documents.

***This outline processor is immediately available in each application, because it has been implemented as a desk accessory.***

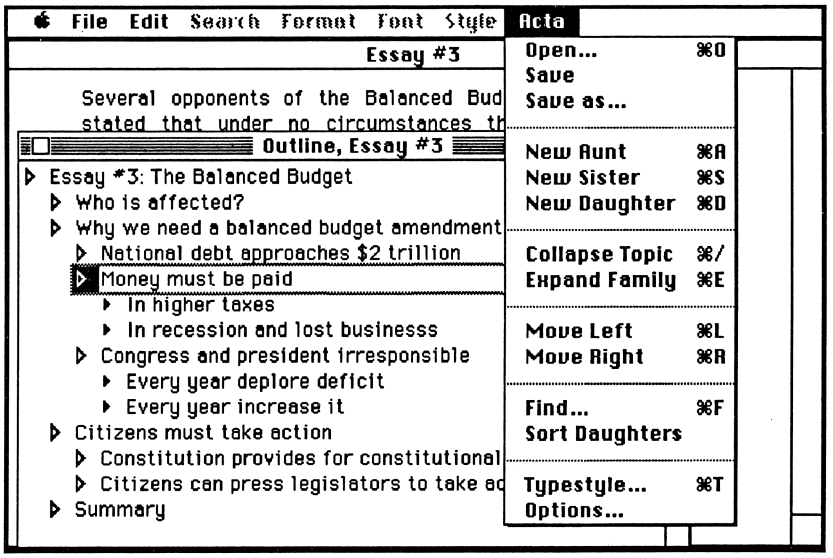
A writer can use Acta to create composition outlines. Since it functions as a desk accessory, Acta is always available during the writing process.

The program is organized using a "family" metaphor. Each idea can be subordinated and edited with ease. (Subordinated ideas are called "daughters" in Acta.) Since Acta indents subordinated ideas, major and minor ideas are not confused, and parallel lines of argument are retained. There is no line limit to each idea or point in the outline. Therefore, Acta can be used as a sentence *or* topic outlining tool. Each topic can be opened to reveal more subordinated ideas or closed to allow the writer to see the "big picture."




***Items that "expand" to additional levels are displayed with a hollow triangle.***

*When using the Acta menu, an item's "Aunt" is an item at a higher level, a "Sister" is at the same level, and a "Daughter" is one level lower.*




## Computer Writing Resource Kit

D. C. Heath Co.
800-225-1388

*The Resource Kit is both a prewriting and a rewriting tool.*

The Computer Writing Resource Kit (CWRK) is both a prewriting *and* a rewriting tool. It's designed to allow teachers and students to gain the most from any curriculum of computer-aided instruction in English composition. CWRK can be described as the "user guide" for a computer-based composition course. Written by Dr. Stephen Marcus of the University of California at Santa Barbara, the kit includes:

*Faculty and student handbooks help to ease the implementation of the kit in different academic settings.*

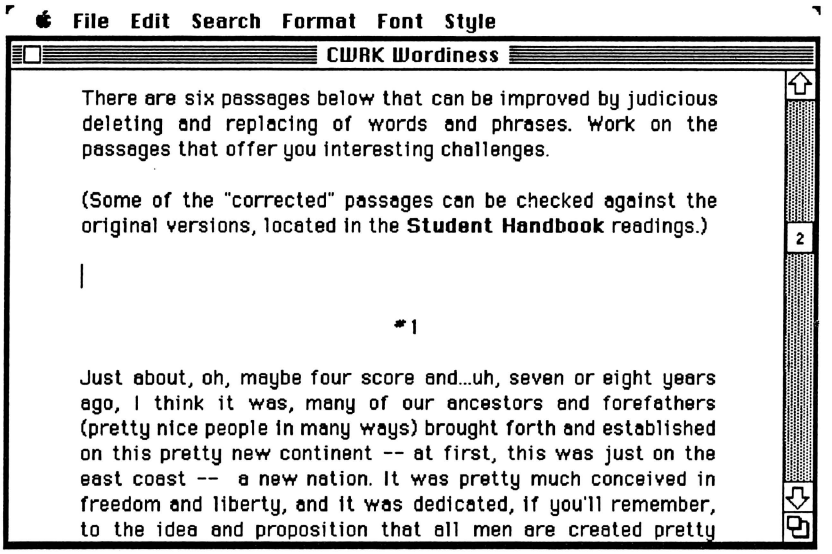
• **A faculty handbook** with resource information for instructors to draw upon. A variety of tested instructional activities are provided that can improve the quality of interaction between student and computer.

• **A student handbook and writing activities disk.** Used together, these tools help students effectively use the techniques of prewriting, writing, and rewriting with the computer in the composition process. Topics covered by the handbook and disk include usage, spelling outlines, themes in literature, wordiness, and other activities.

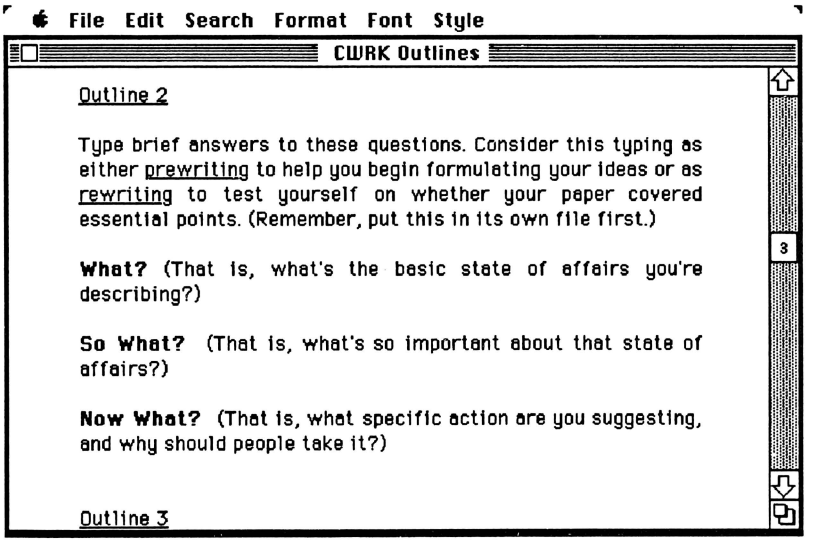
Using the exercises and lessons that are on disk, students can create files for their own work and lists of misused or misspelled words, as well as practice "invisible writing" and other techniques that will improve their writing skills.

The Computer Writing Resource Kit can be a valuable resource for first-time users of computers in composition, or for anyone who

wishes to increase the benefits of a computer-aided composition and writing program.

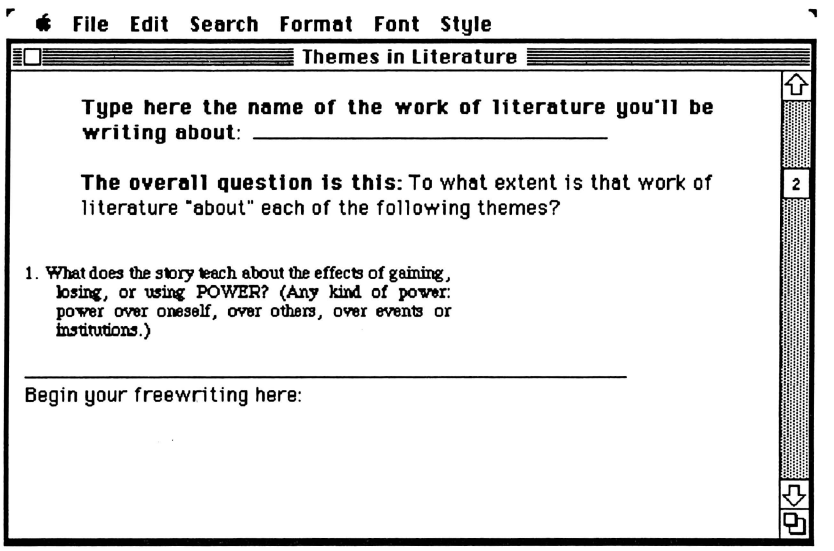



***Students are given suggestions about how to improve a written passage.***

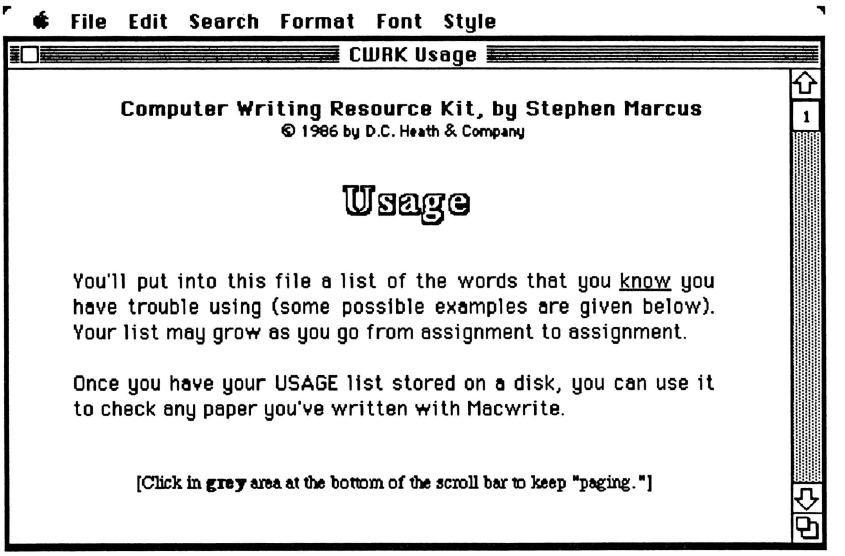



***Formats for outlining ideas at the prewriting or the rewriting stage are provided.***

*"Freewriting" provides a vehicle for students to organize their approach to a writing assignment.*




*Words that students have trouble using can be stored in a "library" and referenced when they write papers.*



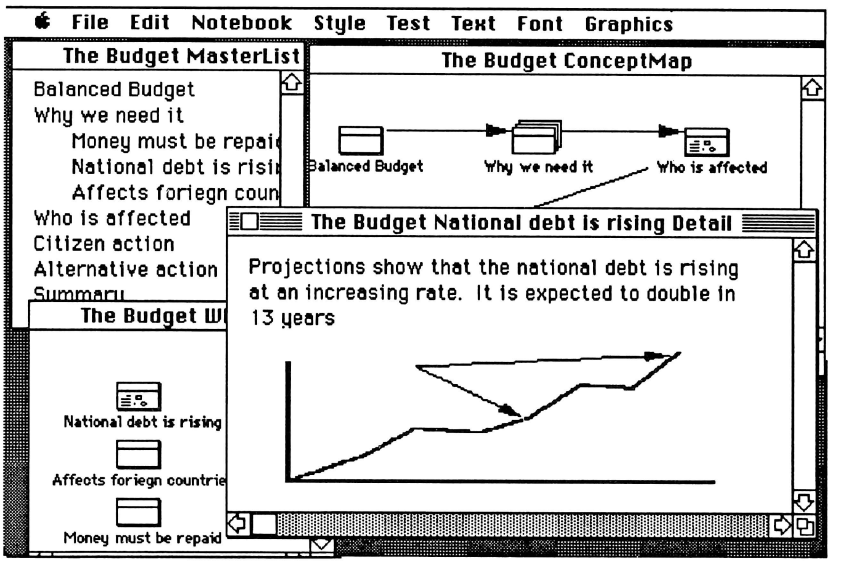

**The Learning Tool**
Arborworks, Inc.
2540 Pittsfield Blvd.
Ann Arbor, MI 48104
(313) 973-0628

*Pictures and note cards can be created to assist students at the prewriting stage.*

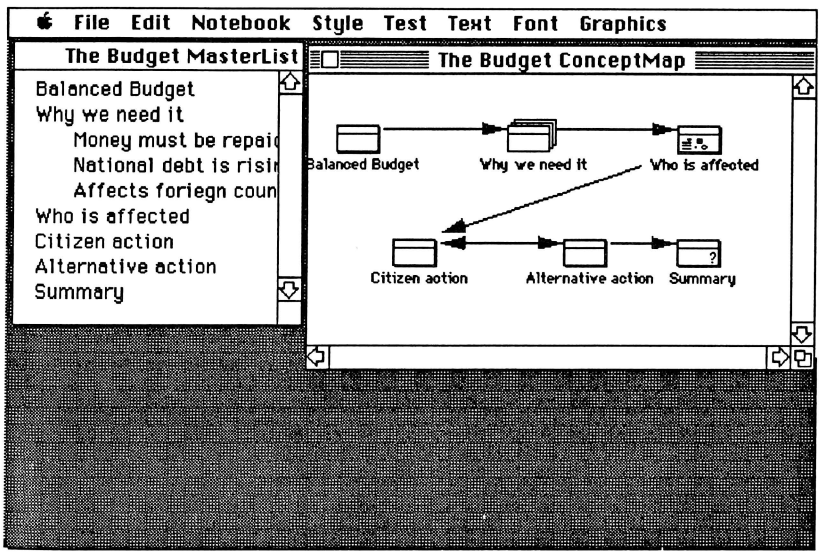
The Learning Tool is a highly graphic approach to prewriting. Students use the Master List as an outlining tool to enter ideas. The Master List outline also allows keyword searches. As each idea is entered on the Master List, a picture of a note card is created on the second level—the Concept Map. Organizing the primary and

subordinate ideas now becomes as simple as point and click.

Students can then link the note cards into a "network" or "Concept Map." This way, ideas can be visualized and shown in an intuitive and "appealing way. Each note card opens, revealing thoughts, notes, paragraphs, and even full pages of composition about the idea. The Learning Tool is especially suitable for presentations, because each window is able to support graphics.

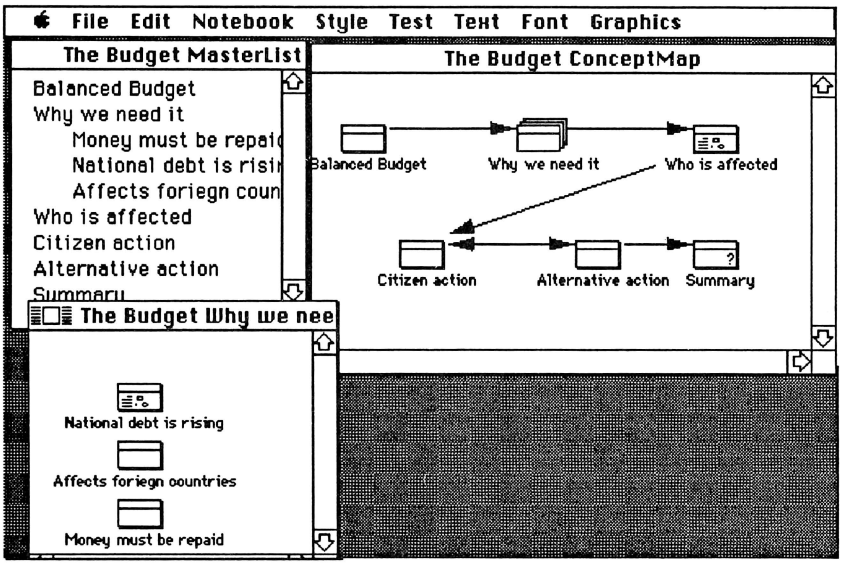



***The Learning Tool provides a very visual way to work with ideas, notes, and outlines.***




***An individual item from a "network of ideas" can be shown in its own window.***

*A hierarchical approach to idea processing is used.*




**PROSE**
The Cornell University Writing Workshop
Rockefeller Hall
Cornell University
Ithaca, NY 14853

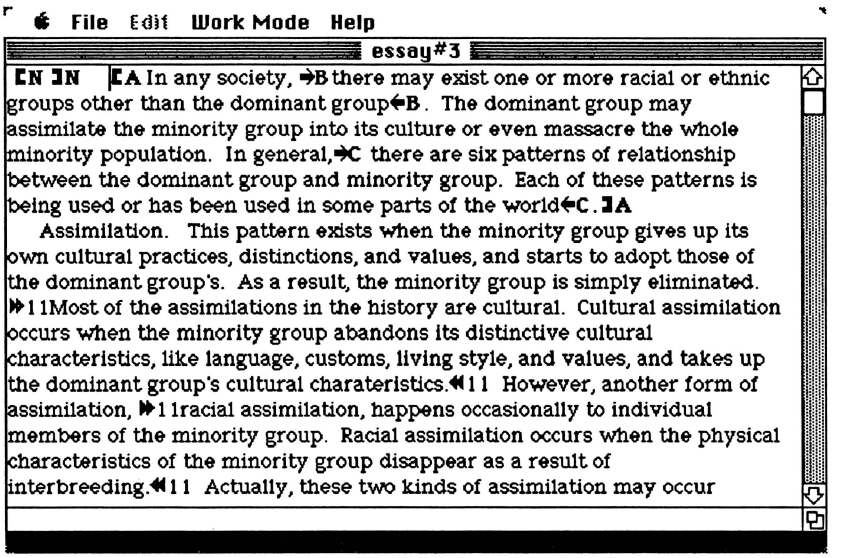
*This writing tool enhances the exchange of information between the instructor and the student.*

**PROSE** (Prompted Revision of Student Essays) is a unique writing tool that can help shape the exchange of written work, comments, and revisions between instructors and students. Students using PROSE submit their work to the instructor on disk. The instructor reads the work directly on the Macintosh screen and makes critical evaluations on pop-up "windows." The completed windows are then closed and small marks remain in the text, which the student can open to reveal the windows. When students review their work, they can view the comments in any order. However, when they begin actual revision, PROSE will lead them through the messages in order.

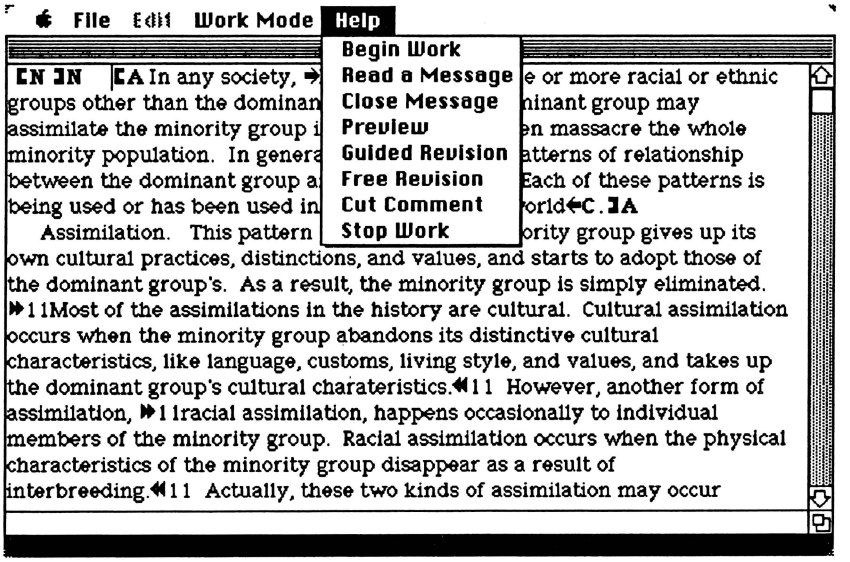
*Instructors can easily provide students with comments, revision instructions, or prompts.*

The student will encounter three kinds of messages. **Comments** are simply that. Students ponder the comment, make a revision if so inclined, and proceed to the next message. It might be a **Please Revise** message. This message also contains criticism from the instructor, but the student is detained here and *must* make some revision. For common errors, precoded **Prompts** are available. Again, revision here is mandatory. Instructors can prewrite their own coded prompts to suit their particular needs.

PROSE, available through Kinkos' fall catalog, is an ingenious way to use the benefits of the Macintosh to draw the student and instructor into the same medium of composition.

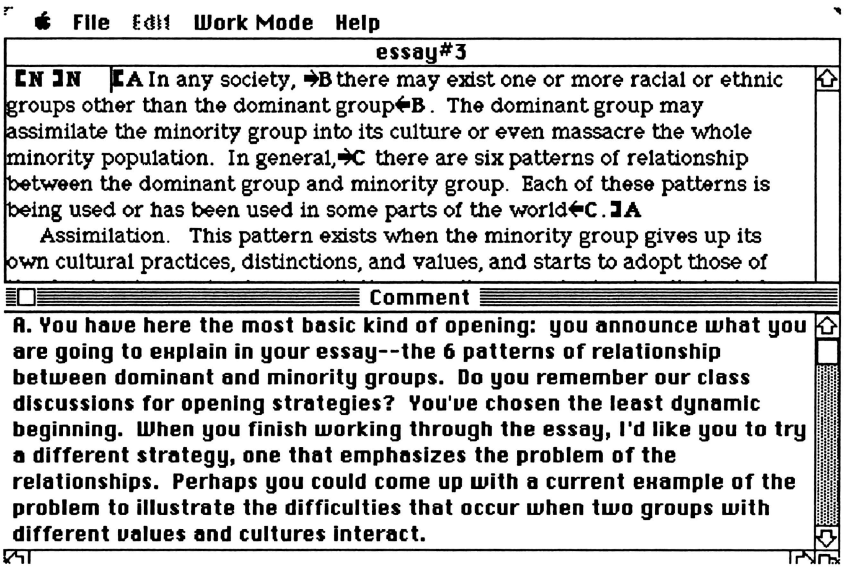



***Previously coded prompts can be used by the instructor to provide information to the student about common errors.***




***Students can be instructed to "please revise" their work before proceeding.***

*A Comment window provides students with feedback about their writing.*




## ThinkTank 512

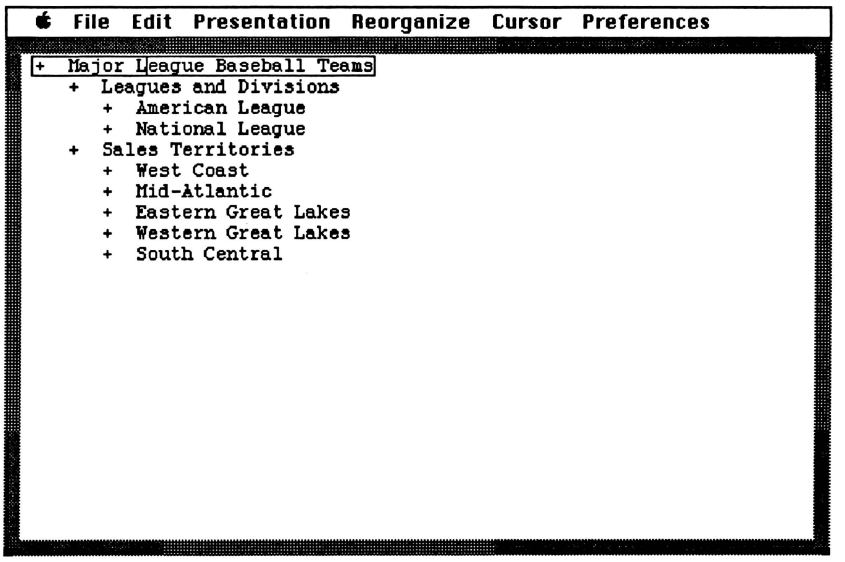
Living Videotext, Inc.
2432 Charleston Road
Mountain View, CA 94043
(415) 964-6300

*With ThinkTank 512, it's easy to reshape outlines.*

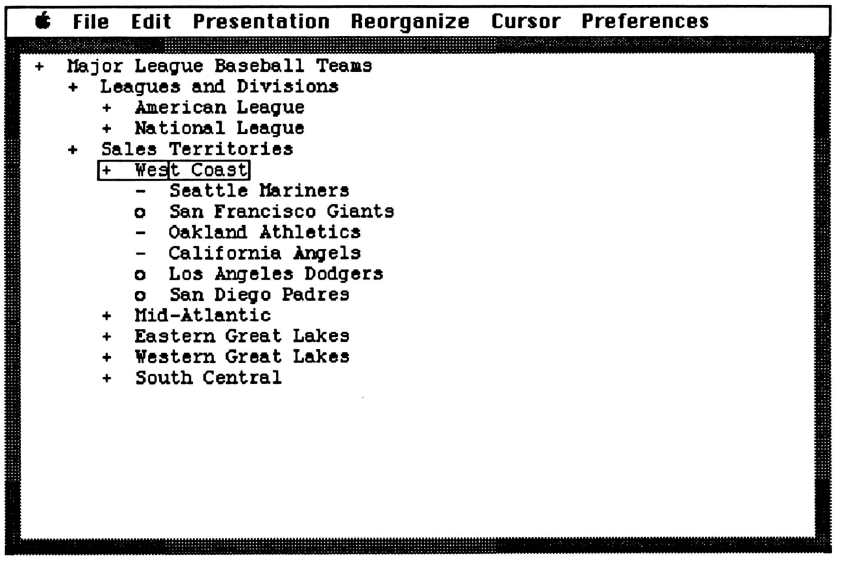
ThinkTank is a versatile prewriting and writing tool. When prewriting, students can use ThinkTank's extremely flexible outlining tools to construct and edit their outlines. Outlines are easily reshaped, because each headline can be dragged with the mouse and placed anywhere in the outline. And these headlines can be far more than a one-line idea. In fact, any headline can contain 16 pages of text.

Scrolling, and collapsing and expanding commands make it easy to organize an essay at any thought level. Another feature of ThinkTank is the "slide show" capability. The writer can display the contents of any headline or text rapidly. Speed can be preselected and graphics can be added. Proofreading for organization and construction in this way reveals much that may be hidden when reading a composition on paper.

The power and flexibility of ThinkTank make it a valuable tool for planning, organization, and writing skill development.

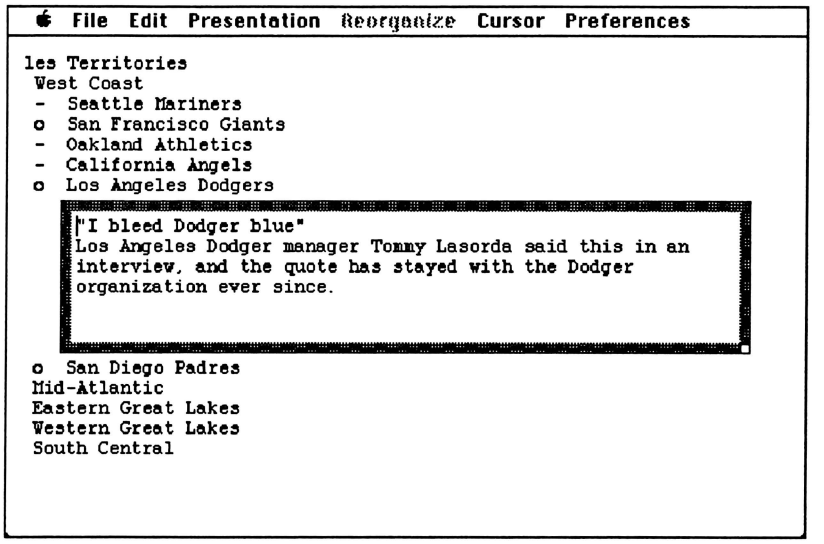



***Topics can be collapsed or expanded with a click of the mouse button.***

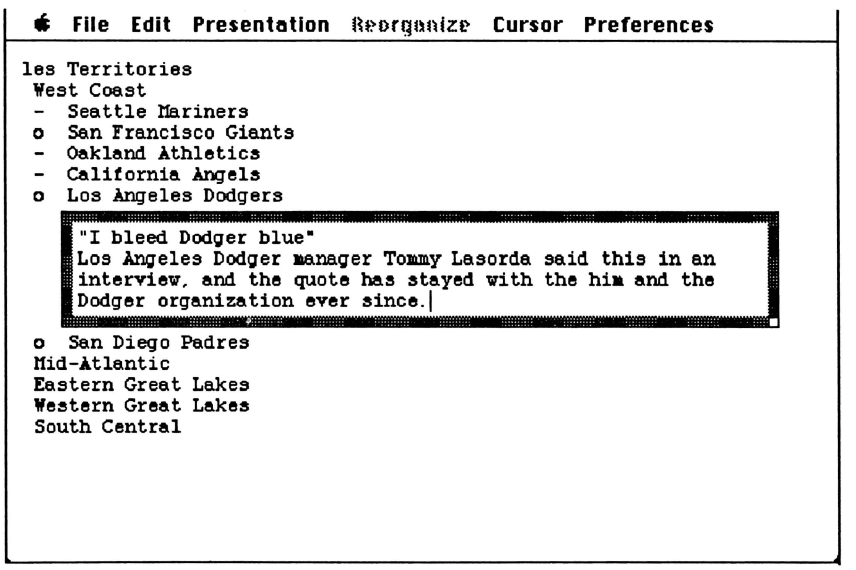



***Several levels are available to the user as an aid in organizing the outline.***

*Headlines can be expanded to include up to 16 pages of text.*




*Text blocks can easily be edited.*




## Tools for Writers

Distributed by:
Kinko's Academic Courseware Exchange
4141 State Street
Santa Barbara, CA 93110-1891
800-235-6919
800-292-6640 in California

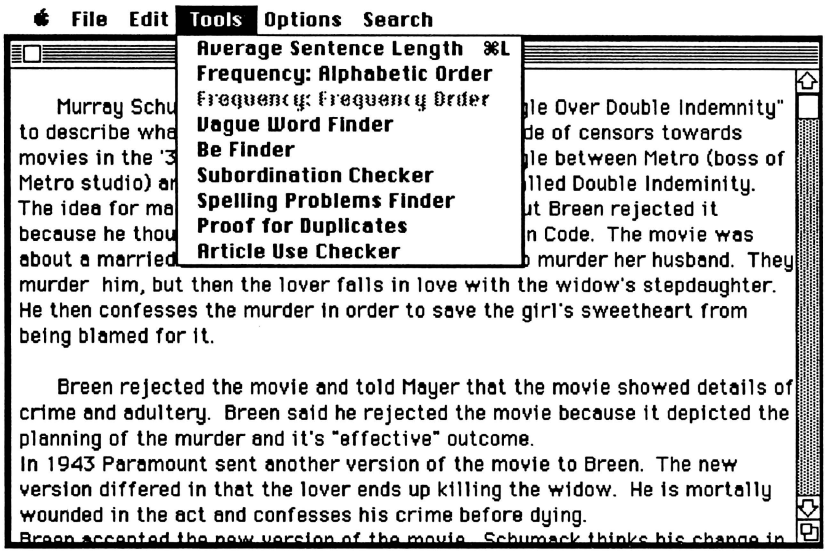
Tools for Writers is a powerful writing and rewriting program that makes many advanced diagnostic features available to the writer. With the built-in text editor, compositions can be written and

immediately analyzed in depth for problems with grammar and usage. Students can check for proper paragraphs, diction, subordination, and use of the passive voice.

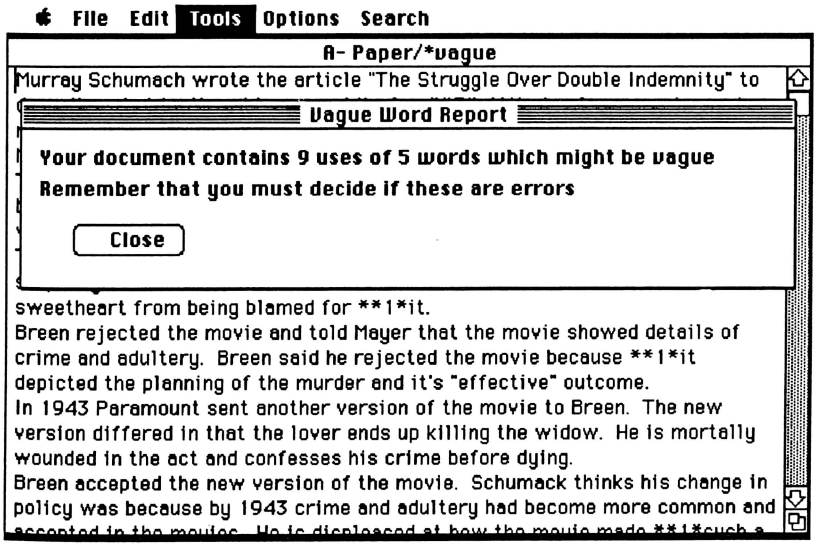
*Compositions can be written and immediately analyzed in depth for problems with grammar and usage.*

In addition to these tests, students and teachers can customize many of the diagnostic features for their own special needs. For example, one test highlights vague words. The preexisting library of vague words that Tools for Writers will use in this test can be expanded by the student or the teacher to address special cases.

Tools for Writers includes a student manual, which provides eight lessons that can serve as a guide for the program or as the basis of a composition course. The package costs no more than a textbook and can also be used throughout the year for other writing.

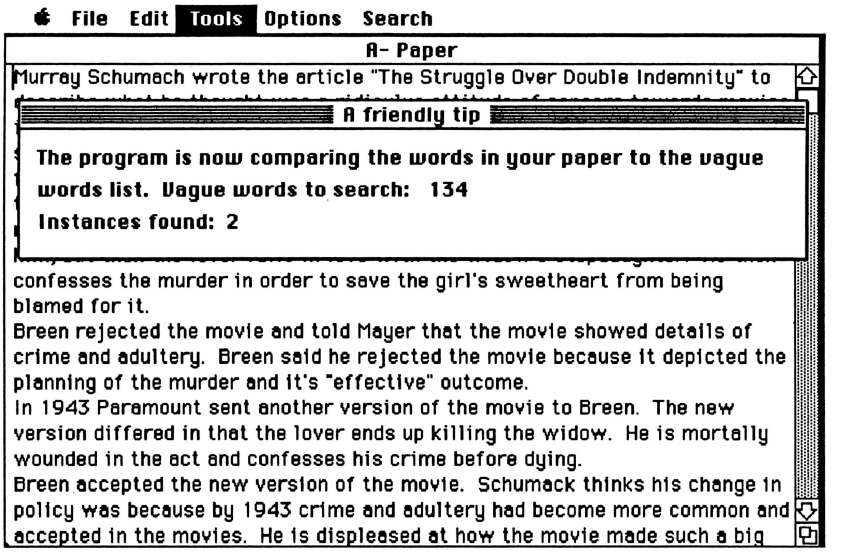



*The paper can be examined for vague words, duplicate items, spelling mistakes, and the proper use of articles.*

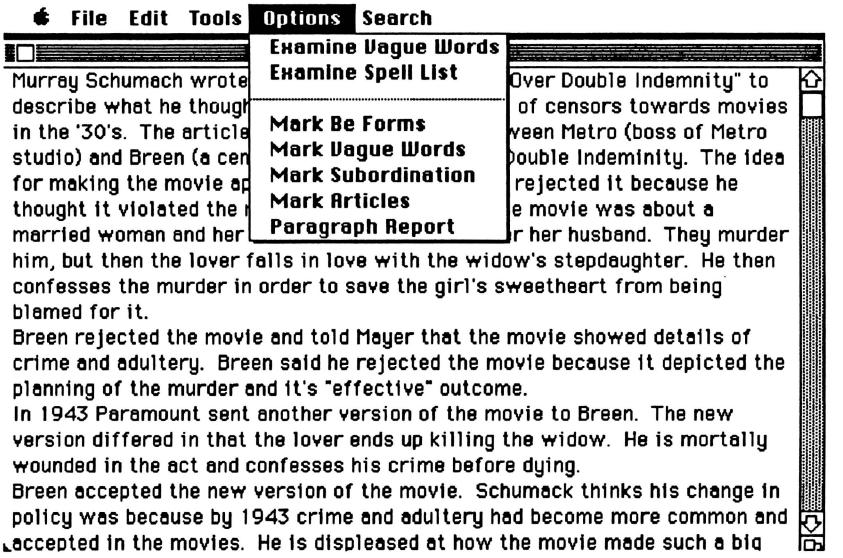


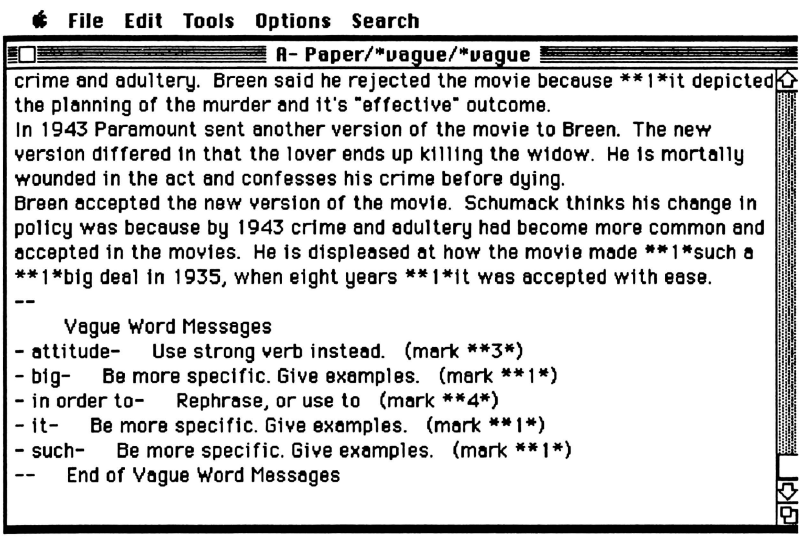

*The user ultimately decides if a word selected as "vague" actually is vague.*

*The existing library of vague words can be expanded by the student or teacher.*

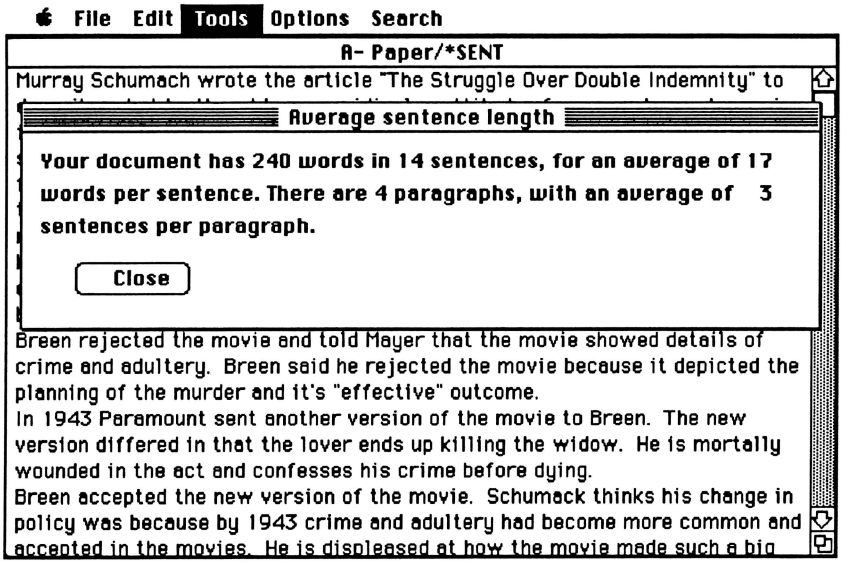



*Items of interest to the user can be "marked" for further reference.*






***When vague words are found, suggestions can be given concerning how to improve the clarity of the text.***




***A simple statistical analysis of the text can provide some very useful information.***

**MacProof**
Automated Language Processing System (ALPS)
190 West 800 North
Provo, UT 84604
800-354-5656

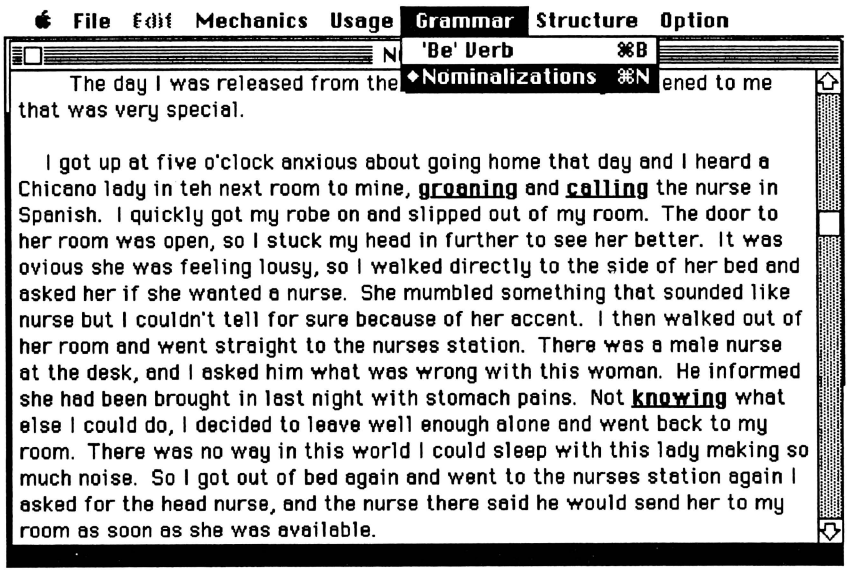
*Spelling, grammar, usage, and structure tools are available in MacProof.*

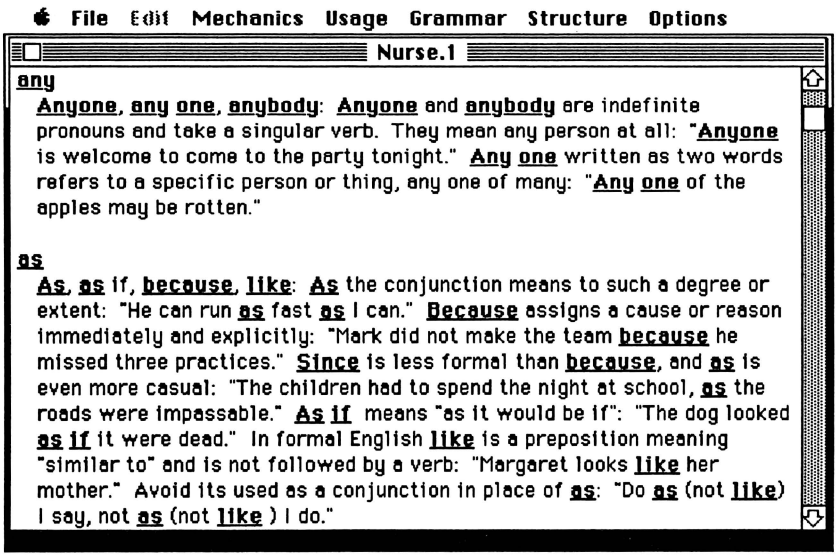
MacProof is a sophisticated rewriting aid that uses four review tools: **Spelling** review will highlight words that are not in the 86,000-word dictionary. As with all of MacProof's rewriting tools, the student must make the corrections—MacProof will only *suggest* changes to writing. The **Usage** feature will identify questionable words—for example, words that are sexist, racist, or vague. **Grammar** will identify constructions that contribute to a weak writing style. For example, the overuse of passive "be verbs" or nominalizations is highlighted. Another feature of MacProof is a **Structure** utility, which displays the first and last sentence of each paragraph so that the writer can examine how the work holds together. All sentences can be displayed in this way as well, to help students discover run-ons, comma splices, and sentence fragments.

MacProof can operate as a stand-alone system on the Macintosh Plus, or be used with the AppleTalk® network and an additional Macintosh acting as a utility server. This networking capability makes it especially suitable for writing labs with several (15 or more) Macintosh computers sharing printers and program resources. Another benefit of a networked lab is that additional Macintosh computers can be remotely located for faculty use.

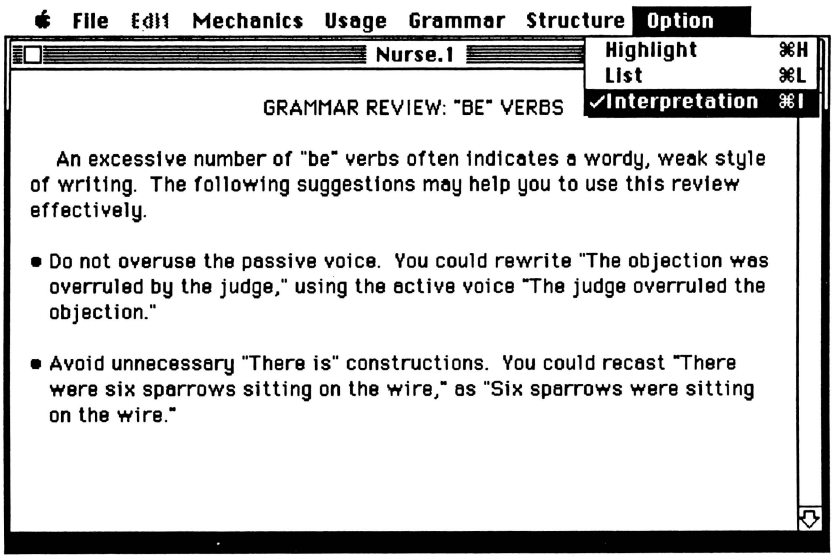
Version 2.0 is now available. It includes all the features described above, and now enable users to check punctuation, capitalization, and repeated words. It also comes with a larger (93,000-word) dictionary, to which users can add words.

*Items of interest are displayed in bold and underlined for easy identification.*



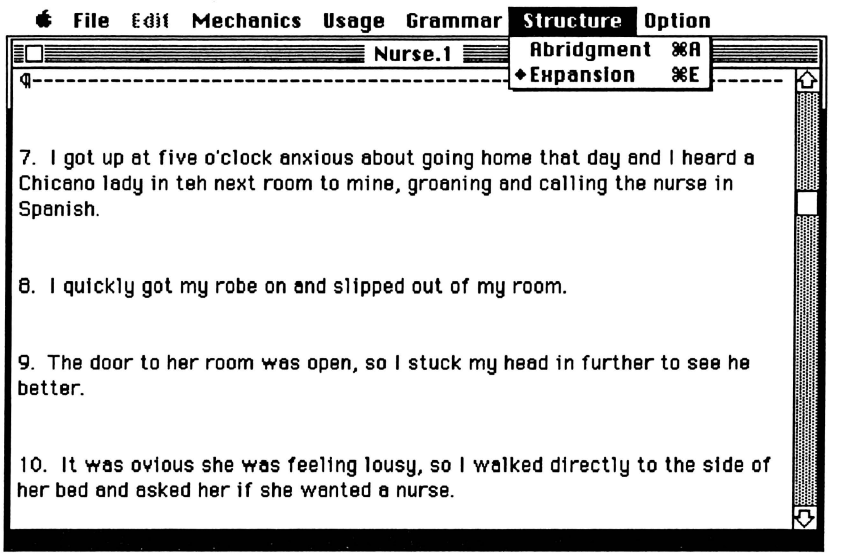



*Explanations can be provided as an aid in understanding the use of certain words.*

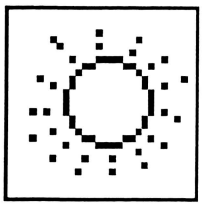



*A review of grammar can help students improve their writing.*

*Text can be expanded to facilitate further analysis.*



# Spotlight



The **Spotlight** section will focus on some of the Macintosh activities that are going on at various schools and universities. Typically, there will be two parts: the first will describe the activities that coincide with the theme of that particular *Wheels for the Mind* issue; the second will be more general, and describe a variety of interesting programs and activities.

## PROSE
## (Prompted Revision of Student Essays)

***We wanted to extend word processing to include helping the student with writing, reading, revising, and responding to what is written.***

Writing on a computer is one thing; learning to write well in a composition course supported by word-processing facilities is another. At Cornell University, students have plenty of access to computers; The Writing Program supports a word-processing center with 20 Macintosh systems, and the university has over 120 Macintosh systems in public terminals. As writing teachers at a Macintosh-rich campus, where students are encouraged to use machines for their written work—particularly the work they do in seminars and workshops offered by Cornell's Writing Program—we sought to extend word processors' powers of instruction and to involve them directly in the prime activities of our courses: writing, reading, revising, and responding to what is written.

PROSE was the result. Begun in the summer of 1985 and coded by student programmers working with the university's Office of Decentralized Computer Services, PROSE was ready for trial use at Cornell in February 1986. In its trial use with just a few sections of Cornell writing courses, PROSE has proved very successful, simple to use, and easily adapted to coursework. An enhanced and fully operative version will be released this fall.

PROSE is a Macintosh applications package designed to serve and shape the exchange of written work, comments, and revisions between writing instructors and writing students. It enables teachers and students to work in the same medium of composition—a word-processing program with facilities for entering and displaying instructors' or other readers' remarks and for guiding students' revisions. It helps expand students' awareness of their resources for rewriting their own work—not only for editing the surface of a text (fixing local errors and substituting new words and phrases for old) but for making "deeper" changes in the structure of sentences and paragraphs and even in the whole shape of an essay. And

PROSE helps instructors to emphasize the writing *process*—the way in which a nascent text becomes fuller or more concise, better focused, and more polished—as much as the finished product.

***The Instructor module reads and displays text files written with any Macintosh word-processing program, so that the instructor can write messages directly in the student's paper.***

PROSE consists of two modules: Instructor and Student. The Instructor module reads and displays text files written under any Macintosh word processor. Reviewing a student essay, an instructor can write messages of any reasonable length at any point in the text in a pop-up window that disappears when the message is done. These messages leave behind markers in the text but remain invisible until opened by the user or the application. Thus the instructor can speak directly to the writer about specific passages—large or small—without any obvious intrusion in the flow of the writer's own prose but with the certainty that the messages will be read when the designated passage is on the screen. And the instructor can choose among three kinds of messages to enter: "Comments" (which are just that); "Please Revise" messages, which encourage the writer to make some change in the text they cover; and "Prompts"—coded labels (with short identifiers) for calling attention to certain common grammatical errors and stylistic weaknesses.

***The Student module lets the student read through all of the prompts and messages and begin to make the appropriate revisions.***

A writer using the Student module can view an essay, opening and reading messages and planning a revision strategy. When the student switches into work mode (called "Guided Revision"), PROSE moves through the text and the messages in a first-to-last order, unless the instructor has set a different work sequence. The program pauses at each message in which the instructor has requested revision and at each "Prompt," waiting for the student to make a change. ("Prompts" give access to lengthier explanations of local problems and to illustrative exercises.) After finishing with "Guided Revision," the student can revise further or print out. Instructor and student can, of course, go through the cycle once more to reshape the writing process or refine the written product.

Writing teachers and their classes can use PROSE in a variety of ways. In a tutorial or laboratory setting, an instructor may mark each essay the student submits, requiring substantial revisions under PROSE. Teachers of more conventional writing courses might use PROSE on several key assignments by each student each semester, choosing those most likely to highlight some significant feature of writing or revision. Members of "workshop" classes can use the Instructor module to comment on each other's work, pooling critical insights to help each writer.

PROSE runs on a Macintosh 128K with one (internal) single-sided drive, as well as on enhanced models. Each of the Student and Instructor modules resides on a separate disk with a System Folder.

Developers: Stuart Davis, Nancy Kaplan, and Joseph Martin. Programmers: Larry Edelstein, Jeff Eldredge, Jeff Kowalski, Michael Culbert. Technical consultation: Kate MacGregor.

# Drake University English Program

Starting this fall, students at Drake University will be seeing a lot of Macintosh computers around, and first-year students will be using a Macintosh in their Freshman English course. For most of them, this opportunity will be their first exposure to Macintosh—and an excellent introduction to computer use in the curriculum at this computer-intensive campus.

Macintosh was chosen for many reasons, among them its user friendliness, storage capacity, and performance value. The extensive selection of excellent software for Macintosh was another contributing factor. The reason the Macintosh is being used in the Freshman English course is that this course affords an opportunity for the largest possible number of incoming students to become familiar with the technology that they will be using throughout their academic career at Drake.

***The extensive collection of Macintosh software was one of the factors in deciding to use this particular microcomputer in the Freshman English course.***

In preparation for this program, faculty across the campus were invited to submit course development plans that included the use of Macintosh in the curriculum.

As the fall term gets under way at Drake University, both faculty and students will embark on a journey into the future, as they become conversant with computers in their courses. From here, it is only a matter of time before they take the technology in hand and expand their personal horizons.

# Oakland University

At Oakland University in Rochester, Michigan, using computers in the teaching of writing and composition is nothing new. Apple IIe computers had been used in the past, but now the Department of English has moved to use of the Macintosh personal computer.

***The Macintosh provides a much more intuitive way to learn to use a computer.***

Macintosh is being used in a number of department courses—from Freshman English to Advanced Business and Technical Writing. The reason for choosing Macintosh, according to English professor Helen Schwartz, is because it seemed to provide a much more intuitive way to learn to use a computer. It also makes it easy for students to learn word processing. "Macintosh gives me more time to teach *writing* instead of word processing," says Professor Schwartz.

Oakland has a large lab of Macintosh computers, which can be divided into three smaller rooms. This is important because others use the Macintosh as well—political science students and students in modern language translation courses.

In the English department, Macintosh is used for 140 Freshman English students per semester. A variety of software is used (MacWrite, MacSpellRight, Microsoft Chart, etc.), in conjunction with the textbook *Interactive Writing,* published by Holt, Rinehart and Winston. Students in the advanced writing courses such as Business and Technical Writing also use the Macintosh lab.

***Word processing offers great opportunities for prewriting, revising, and collaborating.***

What does the future hold for students in Oakland's writing program? Faculty hope for an expanded lab, stocked with the new writing tools that are beginning to emerge. Professor Schwartz feels very strongly that computers enhance the learning of writing skills. As she says, "It's a tool. It's a wonderful tool that allows one to do things that were not previously possible. However, word processing *alone* does not improve writing. Teachers need to be familiar with how word processors work, in order to understand how the technology supports writing instruction. The thing that is most important is for teachers to realize the benefits that word processing offers for prewriting, revision, and collaborative work."

## Lewis & Clark College Writing Project

Lewis & Clark College in Portland, Oregon, has taken an aggressive and innovative approach to implementing computer technology in its curriculum. After two years of intensive planning, a Statement of Mission has emerged that emphasizes a philosophy of learning and knowledge as alive and changing. One of the chief vehicles for achieving this vision involves a core curriculum that ensures that every student graduates with a basic understanding of concepts and methodologies across the liberal arts and sciences. Included in this core curriculum is an emphasis on writing as an essential means of understanding and developing ideas, as well as enhancing personal expression.

***The Macintosh computer is being used in a course called Basic Inquiry.***

Macintosh was chosen for its "unusually accessible design and versatile performance," says James A. Gardner, president of the college. The computer is being used in a course called Basic Inquiry, the first of nine core courses that students take to meet their general education requirements. All incoming students enroll in the Basic Inquiry class, which is unique in that instructors from all academic areas have been trained to teach writing as an instrument of exploring and understanding complex texts from the four major areas of inquiry: natural sciences and mathematics, social sciences,

humanities, and fine arts. Students learn that reading and writing are *active* processes, ways of *making* meaning and sharing it with others.

One technique, the Dialectical Notebook, involves the students in written conversations about a particular text. The writer begins with a passage of text displayed on the screen. The passage will come to the student over the Peer Network, which is being developed using the AppleTalk network, and later, a file server. The student studies the text, and splits the screen to use the righthand column to make sense of the passage—to draw inferences, create hypotheses, to speculate and to probe into its meaning.

***The Dialectical Notebook involves the students in written conversations about a particular text.***

At this point the Notebook, which contains two columns of text, goes out over the network and is picked up by a peer reader or professor. The reader is able to enter the inquiry into the meaning of the passage by binding his/her responses to the student's. When the owner of the Notebook gets these responses back through the Peer Network, he/she will respond again or go on to the next passage. In each cycle, the entire Notebook goes out and returns so that the reader can browse through it and see how inquiry and understanding of meaning develop.

The reader and writer will be able to "fold" the Notebook in any manner to display any two sets of text in side-by-side columns on the screen, and any column will open to a full screen if desired. The history of the writing (dates, number of words, editorial changes, and so forth) will be maintained by the computer.

This software is being developed in the development laboratory at Lewis & Clark, with volunteer help from personnel from Reed College. In addition, design ideas will be solicited from students and faculty in the Basic Inquiry course. Macintosh is currently being used as a tool in various class sections of Basic Inquiry. By next year, *all* sections will be taught in an electronic environment.

Right now, the Development Lab has been established; AppleTalk has been installed; classrooms, labs and clusters have been set up; and faculty training is under way. As students return to campus, half will be introduced to word processing their first week and will be involved in computer-intensive sections of the course. The remaining students will receive instruction and have Macintosh computers available to use.

***This is an exciting new approach to teaching language, writing, and understanding.***

As the project evolves, all Basic Inquiry faculty will be trained on Macintosh and word processing, while design of the Dialectical Notebook and the Peer Network will continue throughout the year. Total in-class implementation will be finished by next fall.

This is an exciting new approach to teaching language, writing, and understanding. With the strong college and faculty commitment to the project, it is certain that the collaborative writing process at Lewis & Clark College will be more efficient and a lot more fun!

# Macintosh in Sports Information

By Steve Shutt, Bowling Green State University sports information director

*I nearly failed the only computer course that I took as a college undergraduate.*

Let me start off by stating that I nearly failed the only computer science course I took as a college undergraduate. But today, if I were without my Apple Macintosh, it would set the operations of my office back seriously.

The Bowling Green State University Sports Information Office has been using the Macintosh since August 1985. In the year that we've had the Macintosh systems, we have totally changed the operation of our office.

First, a little background on a sports information office. You'll find them on the campus of nearly every university in the nation. The duties of a sports information director (SID) vary from university to university, but the basic idea is the same: to provide publicity for the athletic department. It involves public relations, media relations, and helping to form the department's image in the minds of the public. It involves keeping statistics, laying out programs and media guides, and trying to get the name of your Heisman Trophy candidate into the minds of every sportscaster in the nation. The SID is "school spokesperson" who informs the media of a coaching change—the one who lets Al McGuire, and Billy Packer and Keith Jackson know all about the college team before a broadcast.

The SID is also one of the most overworked and overlooked members of the collegiate athletic department. It's a young man's profession; one that often consists of 80-, 90-, and 100-hour workweeks. A great deal of travel is involved, especially in the upper echelons of the profession, at the Alabamas, Ohio States, and Nebraskas.

*The Macintosh computer is a great timesaver—both in the functions that it performs and in the time it takes to adequately learn how to use it.*

Now, where does the Macintosh fit in? First and foremost, it's a timesaver—both in the functions that it performs and in the time it takes to learn how to use it adequately. The day I received my Macintosh, I wrote a news release on it. It's that simple. Being a computer, of course, the Macintosh also stores information on disks, which I find myself constantly referring back to. MacWrite is an outstanding word-processing package, more than adequate for a sports information office. Jazz by Lotus is a five-function software package that contains a data base, spreadsheet, graphics, communications, and word-processing package. And MacDraw™ will help you with forms or any drafting needs.

How has the Macintosh changed our office? Let's begin with one of the most time-consuming projects of a sports information office: the weekly news release. In the age of the typewriter, the writer of the release would type up the information in draft copy and leave it for the secretary, who would come in an hour early Monday morning and type the release on a stencil. After the stencils were returned to the writer, corrections would be made, and the secretary would run the stencils, stuff the envelopes, and on a good day, be finished by 2 P.M.

With the Macintosh, the writer composes the release on the computer, prints out a draft form and proofreads it, makes corrections, then inserts the stencil into the ImageWriter™ printer and prints out a high-quality piece. Thus we have totally eliminated the retyping of each and every release by the secretary, which frees up part of her Monday for more important duties. And the Macintosh also offers a choice of many typefaces; plus styles that include boldface, italic, underline, outline, and shadow; and a range of sizes from 9 to 24 points.

***Stencils are printed directly from the ImageWriter printer.***

Have you ever had an athlete worthy of all-America consideration? In promoting that athlete, you like to keep the media informed of his/her progress during the course of the season. At Bowling Green, we had an outstanding quarterback, Brian McClure, who set four NCAA records and 52 school and conference records during his four-year career. McClure's senior season was the first year our office used the Macintosh. At the beginning of the season, I put together a full page of records that McClure owned or would soon break. Instead of having to retype that list each week, it was simply a matter of erasing and entering the new records. Instead of retyping his game-by-game stats each week, it was as simple as adding his most recent performance to the already growing list of stats. Talk about a timesaver!

We also used the Macintosh to replace the typewriter in the football press box. How many times during a game does your play-by-play typist have to pull out the old razor blade, scrape off a mistake on a ditto, and retype it? Not with the Macintosh. It's just a simple matter of backspacing over the error and continuing. If the action is fast-paced and the play-by-play consumes more than a full page, simply change from 10 or 12-point lettering to 9-point.

***The Macintosh computer is also in the press box during our football games.***

How about putting together a media guide (typing out all the player profiles, series records, rosters, and so on)? Now when the team makes a roster change, all we have to do is make a quick change on the computer; no more retyping the entire roster (which we all know can be a hassle when it comes to football). Though player profiles change from year to year, certain basic information such as high school accomplishments and personal information usually stays the same. Updating a profile is as simple as adding the previous year's stats and accomplishments. And once you enter your team and individual records into the Macintosh, each year is simply a matter of updating. No more tearing pages from last year's guide, crossing out broken records, and penciling in new ones for your typesetter.

***The media guide was put together using some very basic tools.***

*With a modem, sports stories can be sent directly to the newspaper and statistics can be obtained from the NCAA.*

Need the NCAA's football stats? With the Macintosh, it's simple. We used to have to wait for Wednesday's edition of the *NCAA News* before we knew where our players ranked nationally. Now it's easy to call up the NCAA Statistics Service on Sunday afternoons and get a listing of where all your players rank, as well as a listing of the top five in the nation in every category. The NCAA computer also allows you to enter the code number of your opponent for the following week to get up-to-date statistics. All you need for telephone communications is a modem and communications software.

The modem also eliminates those annoying phone calls with non-revenue sports results. Now, it's as simple as typing a story in the computer, and sending it via the modem right into the computer of the newspaper. I have yet to find a computer with which the Macintosh and Apple modem are not compatible.

*The LaserWriter has certainly reduced printing costs.*

Like most SIDs across the nation, I find that budgets are a big concern. Now you can use your Macintosh to eliminate the cost of typesetting. With the advent of the LaserWriter®, a highly sophisticated printer, you can kiss your typesetter goodbye. The LaserWriter states that it produces "near-typeset quality." However, I can't tell the difference between LaserWriter printing and typeset-quality material. Now, we all give nonrevenue brochure copy to the printer camera-ready.

Another addition to our office is a digitizer. A digitizer is like a video camera that reads a photograph or logo into the computer. The photo can then be reduced, or lightened or darkened according to needs.

Why would I recommend a Macintosh over another type of computer? Because of ease of use. As mentioned earlier, it is so easy to learn.

Directing the publicity of 19 intercollegiate sports is a time-consuming operation. But the Macintosh has helped this office to save time and effort, as well as to centralize activities. Besides its ease of use, the Macintosh is also priced at a cost that will not drive your business manager crazy.

Now when I speak with other SIDs about computers, I wholeheartedly recommend the Macintosh.

## Purdue Krannert Executive Master's Program in Management

You have a good executive MBA program to offer. You have beautiful facilities and a great faculty. You are part of a major, well-

respected university. You want to attract people of top management potential into your program. You also are located in West Lafayette, Indiana. What do you do?

Enter Bill Lewellen and Martin Rapisarda, respectively, director and assistant director of the Krannert Executive Master's Program in Management at Purdue University. Their challenge was to design a program to attract upwardly mobile, high-potential managers or management candidates, to allow these folks to remain on their jobs while working toward an MBA degree, and to maintain a sound academic program along the way. They also recognized the fact that the program would need to draw participants from an area outside of the immediate West Lafayette locale in order to support itself. What did they do? Enter Macintosh.

***The challenge was to design an MBA program that would attract upwardly mobile, high-potential managers.***

The Krannert Executive Master's Program has overcome the mentioned hurdles, and has produced some very beneficial and unexpected results, as well. What happens is that with Macintosh, students can do their assignments at their own pace, turn them in, conference with members of their study group, complete group projects and talk to faculty members when necessary—all electronically from the comfort of their own environment.

***Students do their assignments in the comfort of their own environment and then send them electronically.***

The program requires its participants to purchase a Macintosh Plus with printer, modem, and the required software, all of which is bundled together into an affordable package. At the start, participants come to the Purdue campus for an intensive three-day orientation. During orientation, they obtain their equipment and become familiar with the complete system—faculty, course requirements, the electronic linkage system, electronic mail, bulletin board, conferencing, specific applications, and downloading of assignments and templates. Applications used in the program are Microsoft Excel, DataDesk, and MacWrite. The Macintosh is the interface to the School's NCR Tower computer, on which the above-mentioned services reside, via an electronic linkage through a WATTS line.

***The program requires the participant to purchase a Macintosh Plus computer with a printer, a modem, and the appropriate software.***

The next phase of the program is 10 weeks offsite, back in their own cities, where they accomplish a major chunk of the course material. There they learn management concepts, apply them to their own work environment, and turn in assignments over the electronic system. The entire Executive Program spans approximately two years, with on-campus instruction concentrated into six two-week sessions spread out over the course of the program. Thus the electronic linkage component of the program is vital.

Why Macintosh? Well, let's back up a minute. It became clear fairly early on that a computer was a must to ensure success of the program. "We wanted to use tools such as the spreadsheet and data analysis packages and to be able to send in assignments electronically, and the computer seemed to be the ideal vehicle," says Rapisarda.

The program staff agonized over the decision to go with

*The Macintosh computer won because it was the best machine for all levels of computer literacy.*

Macintosh! There were very good arguments on both sides of the question. There was a major argument for selecting IBM equipment because many corporations have that technology already in place. At the same time, the program was attracting a large number of people who were not computer literate. Not only were they new to personal computing, but their various companies also had a wide variety of technologies in place. The Purdue program needed a machine that would be accessible to a broad range of people with differing levels of computer experience in differing technologies. Macintosh won because it was the best machine for all levels of computer literacy, and the students could be up and running very quickly. "We want to teach people graduate management education rather than computer science and operating systems," says Rapisarda. The other major factor in the choice of Macintosh was that it offered the technology and applications together for a price that's not painful to the individual. Versatility, accessibility, and price were the main considerations involved.

*Each member of a study group has a Macintosh computer and an electronic address.*

An integral part of the program is the formation of study groups. This is felt to be a very effective way for people to learn together and grow as a team. In Purdue's case, the problem was how to implement this in spite of the geographical separation of the group members. Again, the Macintosh and its communications capability solved this dilemma. Each electronic study group consists of approximately five students from different companies with differing backgrounds and experiences. They may also live in five different cities, yet still need to complete group projects and case analyses. They are often coming at these cases from many different perspectives, and each person contributes. At Purdue, each group has an electronic address, or mailbox, and members can communicate with each other while maintaining the security of their work from other study groups. With the Macintosh, these projects can be completed by the groups and turned in without the people involved even having to leave their homes!

Now that the school has the idea and the technology, how is it working? According to Rapisarda, Macintosh is not encountering the resistance that he originally feared it would. Reaction has been very favorable, and participants see it as a vehicle—a productive tool. They *like* Macintosh. There have been several other major benefits of the program as a result of integrating Macintosh.

First, the program makes business sense. The participants can remain on their jobs full-time and still complete their degrees. Their sponsoring companies don't "lose" them for an extended period of time.

*Students become involved with leading-edge technology.*

Second, students are becoming involved with leading-edge technology. This way, if they have not already been introduced to personal computing technology, they are becoming familiar with and actively using industry-standard applications, which certainly enhances their managerial effectiveness.

Third, there is a definite advantage in that students can work at their

own pace while offsite. The technology becomes a tool that serves THEM, rather than their having to serve an inflexible process.

*A real camaraderie develops within the class.*

Finally, as a result of being able to work together, even while geographically separated, a real camaraderie develops in the class. Even though people come from varied backgrounds and have differing areas of expertise, they are able to play on their strengths and learn from the other folks in the class. Even people in functionally similar positions at different companies gain new perspectives on their jobs. These phenomena cannot happen in a program that is only geared to weekend sessions.

The benefits have been many and varied so far. What is next for the Krannert program?

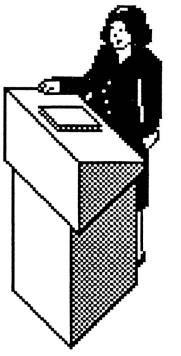
*Faculty are using the Macintosh computer in the classroom and in desktop publishing activities.*

"Now we're seeing what we hoped to see, and that is that faculty are getting more interested," says Rapisarda. Faculty are looking to enhance the teaching of applications in their classes. Not only are they using Macintosh more in teaching, but they're using it for peripheral tasks, such as producing brochures and alumni publications. Macintosh, the LaserWriter printer, and Manhattan Graphics' ReadySet Go are being used in desktop publishing. This started with the business school, but is beginning to be true of other departments as well.

*A partnership is forming between the corporation and the university.*

However, Martin Rapisarda and Bill Lewellen are looking even further ahead. According to Rapisarda, "To date, we're the only degree-granting program with this kind of format. We're the only program that can literally draw people from across the country. My intuition is that companies will become more sophisticated in what they want their employees to accomplish and obtain from the program."

Right now, the main effort of the companies who send their employees through the program is to invest in, enhance, and retain good employees. Most of the companies that sponsor their employees in the executive program are Fortune 500 companies—such as General Electric, General Motors, Eli Lilly, Ingersoll-Rand, 3M, TRW, Owens-Corning Fiberglas, and Honeywell. Many of the firms are becoming actively involved with the selection process of candidates for the master's degree, and there is a real partnership evolving between corporation and university. It becomes a multidimensional relationship—not only the student to the Krannert Executive Master's Program in Management or the student to Purdue University, but also the corporation and Krannert Graduate School.



The goal is to continue to develop this evolving relationship, so that high-potential management candidates are able to obtain the best possible education for the achievement of their goals. Purdue's Krannert Executive Master's Program in Management is clearly leading the way toward making this happen.

# Macintosh Activities at Colleges and Universities Across the Country: A Brief Look

## Boston College

*Athletics*

At Boston College, Macintosh computers are used to do a number of things associated with athletics. Among the applications are ticket promotion, advertising, and seating arrangements. In addition, some football training and analysis applications are being developed.

*Public labs*

A public facility houses 150 Macintosh Plus computers for student use. In addition, the Faculty Microcomputer Resource Center provides facilities specifically for faculty use.

*Management*

The School of Management requires all students to take an introductory computer course. This course features the Macintosh, and several prominent applications packages.

Nearly half of the faculty members now have Macintosh computers.

This year, the Boston College Macintosh Users Group (BC MUG) plans the following activities:

- There will be monthly or bimonthly faculty applications seminars focusing on the use of the Macintosh. These are being promoted by means of a monthly newsletter distributed to all faculty. Simpler topics may be done in a lunchtime format, with more detailed sessions in the evenings.

- Freshman information sessions will be conducted for new students in their dorms, with a focus on word processing with the Macintosh.

- A MacFest™ is being planned in conjunction with the Boston Computer Society.

## Bowling Green State University

*Journal publication*

Bowling Green is using Macintosh computers and LaserWriter printers to publish national academic journals, internal newsletters,

flyers, brochures for the university, and resumes for students. Jerry Wicks is using the Macintosh and a LaserWriter printer in the population and society research department to generate demographic reports for its business clients. These reports are based on sociological and statistical data gathered by the department, which will also begin producing a regional newsletter this July.

*Social science research*

In addition, Wicks has developed a telephone interviewer package to be used in social science research. It collects the respondent phone numbers from a data base in Washington, D.C., dials the number, and prompts the interviewees throughout the interview. They enter the answers, and it compiles the results. It will be finished by the end of summer and so far has been very well received at several social research conferences. Wicks can be contacted at (419) 372-8648.

*Integrating with other systems*

## Brown University

In 1984, Brown began using a link from a Macintosh to a Xerox 9700 laser printer. This consists of a 9700 PrintLink, which connects to Brown's broadband network. A user selects the file to print, the file is transferred to a Sun system and translated into SCRIPT or TROFF. If TROFF, it goes to an Imagen laser printer off the Sun or is shipped over an RSCS line to an IBM 3081, where it is processed by WSCRIPT and sent to the 9700.

*Network projects*

The Harkness Project was set up as a pilot project to network computing services at Brown. Students join the computing co-op, and manage and control the computing services themselves. They have created a wiring hub to extend AppleTalk, allowing Macintosh computers and IBM PCs to connect to network devices. Both coax and twisted-pair wiring go to each dorm room. This allows for laser printing, hard-disk storage, and high-speed mainframe access from a dorm room. The Harkness Library is now a working and learning center. It has promoted a true learning collaboration and has increased the socialization among students.

*In the health sciences*

*In the liberal arts*

A package has been developed that's used in the public access Macintosh in the lobby of the health center. It walks a user through various questions and answers, and diagrams about birth control methods.

InterMedia creates graphics-based, high-powered workstations for research and teaching in the liberal arts. It allows linking of information, annotation, footnoting, and browsing through linked, cross-referenced, annotated, and footnoted texts in a nonsequential manner. HyperMedia can then include pictures, video, voice, and animated graphics. Recently, it has been adapted and is running on an IBM RT, with a Macintosh-like look.

*Catalog typesetting*

## Carnegie-Mellon University

*MIDI interfaces and music synthesizers*

The Macintosh, Aldus PageMaker, and a LaserWriter printer have replaced the annual CMU typesetting catalog. The paper (*Tartan*) is being converted to production using Macintosh and an Allied Linotype machine. CMU is offering regional courses in design to other schools in the area.

## Case Western Reserve University

*Tracking medical admissions*

A Music and Technology Center has been set up on campus and is using the Macintosh, Apple IIs, LaserWriter printers, and musical MIDI interfaces, synthesizers, and so forth to improve the learning and teaching of music theory and composition. CWRU also works in conjunction with the Cleveland Institute of Music using this lab.

## Cornell Medical College

The Medical College is using Macintosh computers and Blyth Software's Omnis 3 to develop a multiuser system for automatic entering, processing, and tracking of 5,500 applications for admission to the college. Applicants to medical schools send one application to American Medical College Applications Service and check the schools they wish their application to go to. AMCAS duplicates the application and forwards a hard copy to the selected schools. In addition, AMCAS makes a nine-track tape available to the school. Cornell wrote software (called TAPE) that reads the AMCAS tape and downloads the demographics for each applicant into Omnis 3. Thus the records are always updated. The data base can be used at other schools with some easy customization. For information, call (212) 472-4643.

*Campuswide networks*

## Dartmouth College

All dorms are hardwired into the campus network and time-sharing system. Students can use Macintosh computers as stand-alone systems or terminals.

*Accounting*

The Kiewit Network is a general-purpose local network connecting all terminals and micros on campus. Wiring is in all academic, administrative, and residence buildings on campus. It is universal (connects to all host computers at Dartmouth), dependable (85 nodes, very reliable), inexpensive, responsive, and fast. There are a variety of computing environments: Dartmouth College Time Sharing, UNIX, VAX/VMS, and IBM VM/CMS. The network is used for instructional, administrative, and general computing purposes. There are 1,800 Asynch terminal ports.

## Drake University

The Drake Business School is integrating the Macintosh into its accounting curriculum, using Microsoft Excel along with some programs developed internally. The school is currently in contact with Arthur Young and Peat Marwick Mitchell to see about securing some of their software to use in its audit courses.

***In the anesthesiology department***

## Duke University

The anesthesiology department is using the Macintosh in the operating room at Duke for blood pressure and oxidation level analysis. Staff track the data, feed it into Excel, and graph the trends. The university is also putting in a lab of Macintosh computers in the medical school and will be transferring data between the IBM and the Macintosh. In addition, Duke University staff have also developed some customized applications on the Macintosh using FORTRAN.

***For faculty and students***

## Georgia Institute of Technology

The plan is to put a Macintosh computer on every professor's desk. Faculty eventually will get their phone messages through the Macintosh. There will be a 25-Macintosh computer lab for students and faculty, open to the entire campus. Curriculum is being developed around the Macintosh, and templates will be developed on Excel and Omnis 3. The program will be documented so that other schools can obtain the information.

***Teaching natural Indian languages***

## Humboldt State University

Dr. Bennett has been using Macintosh computers to teach natural Indian languages to Indian schoolchildren. With help from Dr. Marc Cogan of Wayne State University, special fonts were created in order to teach the languages. Several projects have been completed: the *Hupa Natural Resources Dictionary*, *Yurok Natural Resources Dictionary*, and *Karuk Acorn Book.*

***Accounting labs***

## Memphis State University

***For veterinary students***

Macintosh labs for accounting are being set up that will use the AppleTalk network. Odesta Helix is used in a data-base class.

## Mississippi State University

The Macintosh is required for veterinary students. To help students to cope with the vast increase in information that they must know, school staff decided to use a microcomputer as a tool for research and learning. In addition, expert systems are being used to design diagnostic tools for animal research.

***Architecture/CAD***

*Simulation models*

## MIT

A CAD/architecture class is being taught using a Macintosh computer and an enhanced version of MacDraw.

*In the business students' dorm*

The Sloan School of Management is using STELLA to teach System Dynamics. This has been very successful in building simulation models of complex social systems and allowing students to understand those systems, diagnose problems, and suggest corrective measures.

## Northwestern University

*Computer planning*

A Macintosh lab has been set up in the residential College of Commerce and Industry, the business students' dorm. It has 15 Macintosh computers, a Macintosh XL, and several ImageWriter printers. It has been very successful and receives heavy usage—as many as 40 students per night.

## Ohio State University

*Atlas of information networks*

OSU is putting together a comprehensive plan for the integration of computers on campus.

## Oregon Health Sciences University

*Publishing, graphics, scanning*

Several interesting publications have been produced using the Macintosh and LaserWriter, including an atlas of information networks in the Northwest. Several more publications are planned.

## Purdue University

*Studying fly brains*

The entymology department has been heading up a lot of usage of the Macintosh computer and desktop publishing. Staff members are producing newsletters, brochures, and course materials using the Macintosh and LaserWriter. For graphics, they have been scanning images using Thunderscan. A lot of the brochures are used for the cooperative extension service. The software that is used includes Word, MacWrite, and PageMaker. They also can take MS-DOS files that are sent to the NCR Tower minicomputer and send them to the Macintosh for final production and inclusion in newsletters.

*Technical graphics work*

A graduate student in entymology has been studying fly brains to make further studies on feeding behavior. He took many photos of fly brain cell cross-sections, digitized them in sections using an Apple II with a graphics tablet, assembled the pieces into single images again on the II, moved the data to a Macintosh, and then wrote a program in BASIC to rotate them in space and time. This

was to give the sense of viewing the entire cell three-dimensionally so that others, unfamiliar with this work, could better understand. Before the Macintosh computer, this would only have been possible on something like a VAX.

The technical graphics department is using Macintosh Plus computers and LaserWriter printers along with Bridgeport CAD software, EZ3D, Mac3D, Microsoft Word, Draw, MacDraft, and MacPerspective to do technical graphics work. Department staff have done their course materials and a journal using these tools.

*Fiber optics network*

**Reed College**

*School news*

An experimental fiber optics network is now up and running at Reed.

**Seattle University**

*SmallTalk*

The school newspaper is being done on the LaserWriter.

**UC-Davis**

SmallTalk on the Macintosh XL is being taught in the math department. The course is being dynamically designed with lots of input from students. References are from the SmallTalk Blue and Orange books. The object of the course is to give students a taste of the leading-edge technology so that they can more intelligently make choices concerning what programming languages to use.

*In the art department*

**University of Georgia**

A student in the Art Department here won the Filevision award. Macintosh computers are used in the lab at the art department, which has been open to the rest of the university since its installation.

*Publishing a math journal*

*Engineering design*

**University of Houston**

The Macintosh computer and a LaserWriter are being used to publish a math journal.

Several consulting agreements with corporations in the Houston area (Lockheed, Shell Oil) utilize the Macintosh for engineering design work. Specific software is designed for them. This software is also used in the graduate school, and all money made from consulting activities goes into the graduate school, as well.

*Student trainers*

*Foreign languages*

**University of Illinois**

*Computing publications*

There are four clusters of 8 to 12 Macintosh computers in dormitories at the University of Illinois Champaign Urbana. Twelve students have been trained to act as "peer trainers."

The Macintosh computer is being used extensively for foreign-language word processing.

**University of Iowa**

*Introductory engineering*

Macintosh computers and a LaserWriter printer are being used to produce computing publications. An Allied typesetter has just been installed on the university's campuswide network. Macintosh computers and LaserWriter printers are being installed around campus for access by faculty and students.

The School of Engineering has installed 87 Macintosh computers on faculty desks, and more will be put into labs for MacDraw or MacDraft use in the introductory engineering courses.

*In the dorms*

Macintosh computers are being put into Token Ring networks over the summer. The university also has an Ethernet backbone into which it will fit 17 Token Rings.

*Career planning*

**University of Michigan**

*Sharing public domain software*

The housing division has installed 4 to 15 Macintosh computers in each dorm on campus. There is a pilot program in one dorm where the RAs have received a Macintosh. The RAs say that the students are making more contacts, sharing ideas, and teaching each other.

The university also has 15 Macintosh computers and 2 LaserWriter printers set up in its career planning and placement office.

*School of Journalism*

An external-file-system project has been developed from public domain software and allows the Macintosh computer to store and access Macintosh files on a mainframe. This is done through a desk accessory, and the user can upload and download files by simply dragging icons. The files remain in Macintosh format.

*Home economics*

**University of Missouri at Columbia**

*Graduate School of Business*

The School of Journalism has installed 32 Macintosh computers and a LaserWriter. The lab will be used in the advertising curriculum for ad composition and layout.

The home economics department is using Macintosh computers with MacDraw and MacDraft for floor planning and design.

*Desktop publishing*

The Graduate School of Business at Wrightman AFB is using Macintosh computers and Jazz over the AppleTalk network for business-school case analysis and write-up. It has 12 Macintosh computers linked over AppleTalk to an XL running XL Serve

software. Students come into class, pull case details off the server, and do their analysis on local Macintosh computers.

### University of Oregon

*Applied information management program*

Graphics conferences for different areas (such as business) are designed and presented using the Macintosh. The school does all brochures, flyers, agendas, and design and production work using the Macintosh computer, a LaserWriter, PageMaker, MacDraw, and Microsoft Word. Staff create camera-ready work and have it professionally printed from there.

*Computer literacy*

The University of Oregon will be offering a master's degree in applied information management in conjunction with Tektronix. The degree will be interdisciplinary in nature, with the business school, public policy, art education, and education involved. Classes will be at Tek in Portland, with employees of Floating Point and Mentor Graphics also attending. Macintosh computers are planned as part of the program, which will accommodate between 30 and 50 students.

### University of South Carolina

*Recruiting*

The University of South Carolina has standardized on the Macintosh computer for computer literacy. Students spend four weeks on MacWrite/MacPaint™, eight weeks on Jazz, and two weeks learning BASIC. The university installed another 25 Macintosh computers this summer.

### University of Tulsa

*University newspaper*

All of its recruitment letters, data bases, and budgets are prepared using the Macintosh computer, a LaserWriter, Lotus Jazz, and Microsoft Word and File.

*Artificial-arm project*

### University of Utah

The Macintosh computer is being used to publish the university newspaper.

*LaserWriter applications*

An artificial-arm project that uses the Macintosh to teach the patient how to use the new device is under way. There is also a project that will seek ways for paraplegics to control the Macintosh computer using only their heads.

### University of Washington

The University of Washington's business school is using the LaserWriter with its ATs—232 connections using PC Word. The

school is starting to incorporate the Macintosh computer into this program because of its graphics capabilities. Other departments are preparing course outlines on the Macintosh computer. The rehabilitative medicine department is doing its prothesis instruction manuals on the LaserWriter. The flyers, information sheets, announcements, and other pieces are all also being done with desktop publishing.

*Statistics*

**University of Wisconsin Milwaukee**

*Developmental anatomy*

Statview and Helix are being used together in working with and teaching statistics.

*Macintosh and the VAX*

**Washington University**

VideoWorks is being used in developmental anatomy.

The university is involved in a project using DEC VAX computers as part of an integrated campus network. Plans are under way to use the Macintosh computer as a graphics terminal tying into theVAX and the MicroVAX.

*AppleTalk network*

**Wayne State University**

An extensive AppleTalk network is in place, with 24 Macintosh Plus computers, 5 LaserWriter printers, and with over 1,500 feet of cable. Macintosh computers are in the offices and labs of the chemistry professors. They are primarily used for word processing and as productivity tools.

# Washington College CAPHE Awards

Washington College, in Chestertown, Maryland, has received a strong vote of confidence in its academic computing program from one of the most prestigious supporters of higher education. The Consortium for the Advancement of Private Higher Education (CAPHE) approved Washington College's proposal for funding to explore new ways to apply its advanced computing program to the liberal arts and sciences curriculum, and gave the college its largest grant: $50,000. The thrust for the Consortium's efforts is to help small colleges to resolve basic problems by assisting one college in a program that will, in the long run, benefit all small colleges.

***The grant will help the college explore new ways to apply its advanced computing program to the liberal arts and sciences curriculum.***

The College's Academic Computing Program was initiated last year. The campus is linked electronically to the Computing Center at Dartmouth College, which allows the students and faculty to access electronic mail, file transfer, on-line information services, and the massive library and catalog system. On the Washington College campus, a network called WashNet has been established to electronically link the college's computer center, one residence hall, and five other buildings. All of the buildings and residence halls will eventually be phased in to the network.

Working through the WashNet system on campus, Macintosh users can access hundreds of academic programs, perform class assignments, communicate with faculty and students, and store data. These services are available at all Macintosh workstations on campus and will soon expand to each dorm room on campus.

***Macintosh computer users can access hundreds of computer programs.***

Washington College faculty members can apply for individual research grants under the CAPHE grant to study ways in which computing can enhance their teaching efforts. These could fund anything from studying application of software programs in their fields to classroom work to attending academic computing seminars or traveling to Dartmouth to study ways in which faculty members can make better use of the Dartmouth computing network.

In almost every department there are projects under way to integrate the Macintosh into courses. The following is a brief listing:

| **Dept.** | **Person** | **Project** |
|---|---|---|
| Art | "Tex" Andrews | Integrating an interactive computer program into Fundamentals of Visual Design. |

***The Macintosh is finding its way into curriculum projects all over campus.***

***Everything from art and music to library tours to finance.***

| Dept. | Person | Project |
|---|---|---|
| Economics | Michael Bailey | Using Microsoft Excel and ThinkTank to convert the Quantitative Methods course to Macintosh presentation. Also working on special topic, "Computer Applications in Economics." |
| Business Management | Lauren Bedell | Integrating Multiplan and Excel into the Corporate Finance course. |
| Sociology | Steven Cades | Developing a package of interactive demonstrations of sociological data analysis for Research Methods. |
| Library | Jeff Chaffin | Devloping a guided tour of Miller Library for freshman orientation, introducing students to location of documents, tools, interlibrary loan, and commercial data bases. |
| Music | Garry Clarke | Use MusicWorks, Mozart, and AppleTones software in Elementary Music Theory to teach students about the composition process. |
| Physics | Juan Lin | Integrating two nontrivial simulation programs into lab exercises for Physics 100 (Contemporary Physics): Kepler's Equation and Random Walk in Two Dimensions. |
| Mathematics | Wendy Morrison | Using Macintosh for lab work and programming problems, as well as integrating it into Introduction to Computing using the Macintosh and the Prime Computer. |
| Psychology | Marci Pelchat | Using a digitizer and ThinkTank to present Macintosh slides and lecture notes in both graduate and undergraduate courses. |

| | | |
|---|---|---|
| Chemistry | Rosette Roat | Using the CHEMANET (Chemical Analytical Network) system to assemble an analytical data base that allows students to identify unknown compounds through an interactive program using the Macintosh and the Prime computer. |
| Business Management | Terry Scout | Developing a decision-support software supplement for Management Strategies that allows in-depth analysis and development of alternatives in case studies. |
| Physical Education | Karen Smith | Using the MacDiet program to establish a model for use in PE 101: Nutrition. |
| Psychology | George Spilich | Using Macintosh to teach statistics and complex paradigms in cognitive science in three psychology courses. |

These are a few of the projects going on at Washington College. As the program expands, there seems to be no limit for the future of academic computing and Macintosh at Washington College. According to Elizabeth Baer, dean of the college, "There's little doubt that every student will either own a Macintosh computer or have ready access to one shortly. It's also likely that a good percentage of the college's coursework will require the Macintosh in some way. Yet the real promise for the computer lies with the students. It depends on their ability to apply its use to their needs, and those applications seem endless to me."

***As the program expands, there seems to be no limit for the future of the Macintosh.***

# The Art of Understanding Data

By Lynne Goldstein
Department of Anthropology
University of Wisconsin-Milwaukee
Milwaukee, WI 53201

**Exploratory data analysis and teaching**

I am an associate professor of anthropology; specifically, I am an archaeologist. I also teach statistics and data analysis, in the form of two anthropology-oriented courses—an introductory statistics class for undergraduates and a graduate-level advanced data analysis course.

***Controlled experiments are, at best, very difficult.***

In anthropology specifically, and in social science generally, it is rare that we deal with classic statistical inference. Controlled experiments are at best very difficult, and usually impossible. This means that most of our data must be examined, not with a view of testing hypotheses *per se,* but rather for what the data can tell us.

***There is a need to "play" with the data.***

Tukey, in his monumental work *Exploratory Data Analysis* (1977), is concerned with exactly this problem; he has labeled the examination of "what the data can tell us" Exploratory Data Analysis, or EDA. To this end, he and his collaborators have developed a variety of techniques whose intent is to allow the researcher to become familiar with the flavor of the data. The techniques Tukey describes are based upon two premises: 1) No strong *a priori* assumptions concerning the nature of the data, its distribution, and internal relationships can be made. This leads Tukey to rely heavily on so-called robust measures: the median instead of the mean, the range instead of the variance, and distribution-free instead of normal statistics. 2) There is a strong need to "play" with the data: to present the data in the form of simple graphs and charts. To this end, Tukey has provided a large set of techniques for "scratching down numbers."

***The personal computer facilitates this play.***

This second premise was also predicated on the limits of the tools commonly available. For Tukey, this meant pencil and quadrille paper. For us, however, this means a Macintosh with a mouse. Tukey's techniques are predicated on human limits. Addition is hard; multiplication even more difficult; and by the time you get to square roots and logs—forget it. So Tukey has supplied a battery of tricks and techniques (for example, fast roots, fast logs) to try and avoid these arithmetic operations. One cannot fault Tukey's reasoning in this matter. When he was developing these concepts, he simply could not foresee the technological revolution that was barely 15 years away. Today, with a personal computer, addition and multiplication—indeed, even the most complex arithmetic operations—are trivial.

The point of all of Tukey's work is to allow the researcher to discover relationships and "information" present in the data—in other words, to get a close feel for what the data tell us. Teaching students the art (and I would emphasize that it *is* an art) of understanding data is the central point of my advanced statistics and data analysis course. The problem is that gaining that feel requires a lot of plain, hard work, as does learning any art. This last semester, I used StatView 512+ by Brain Power, Inc. (a statistics package designed specifically for the Macintosh) as a teaching tool to reduce the drudgery needed to acquire this art.

***Understanding data is an art.***

Before I describe the specific approach taken in the course, it is important to note that many of the specific techniques developed by Tukey are not always necessary to perform exploratory work. One does not, for example, necessarily "need" stem-and-leaf displays, because they are designed to be a way to get quick scatter plots and histograms. If the computer does this quickly and simply—and even interactively—the stem-and-leaf display itself is not needed. Of all the techniques developed by Tukey, the box plot (or box-and-whisker display), is the only one that had no analogue in the usual repertoire of graphic-display techniques.

Students in the data analysis class spent the first portion of the semester gaining an understanding of matrix algebra, and the fundamentals of various multivariate statistical techniques. (It was assumed that they already understood basic univariate and bivariate techniques.) The second portion of the course was spent on the analysis of a specific data set.

As it happened, all of the students in the course this year were interested in archaeology. Because of this, the data presented to them consisted of measurements made on a set of whole pots recovered from an archaeological site in Illinois. (I had collected the data some years earlier.) These data were ideal for a class of this nature for a variety of reasons: all kinds of variables were included: binary, nominal, ordinal, interval, ratio; the information was manageable—there were 110 pots, measured on 25 variables; a number of data-cleaning problems would have to be resolved by the students; and the data could be easily and logically subdivided into smaller groups that might be fruitfully analyzed and compared. Discovering these subdivisions was, in fact, one of the primary tasks assigned to the students.

***Examples were chosen that were of particular interest to the students.***

Students were given background information on the pots, they read the original archaeological reports and papers, and I outlined some of the things we knew about the site. One of the main areas of interest was whether the pots in one half of the site were produced earlier or later than pots in another half. The students were instructed to get a feel for the variability of the data, and were told to try to find any patterning that might exist. They were then supposed to interpret the results of their analyses.

***Students were instructed to get a feel for the data before trying to interpret any results.***

The data had originally been entered into an SPSS-X file on a mainframe (a UNIVAC 1100/81 at the University of Wisconsin-Milwaukee). These data were downloaded to the Macintosh via the

*The data were downloaded to a Macintosh computer for use with a statistical package.*

Kermit communications program, then were put into StatView format. It is relatively easy to import data into StatView. Once in StatView, some of the variables were recoded to take advantage of the program's ability to handle category/alphanumeric data.

In the past, SPSS was the primary computer program I used in teaching this course. However, SPSS was not designed or intended for this sort of problem. Barriers of operating systems, mainframe turnaround time, and limitations of SPSS itself make it of limited use for exploratory data analysis. For this course, SPSS was used only when the desired procedure was not possible within StatView (necessary only for a few of the multivariate techniques).

**StatView and data analysis**

It should be noted that the version of StatView used for this class was a Beta version (0.92) of StatView 512+. StatView 512+ is significantly different from the original StatView program; for the purposes of this discussion, its major distinction is an expansion of the procedures available, including the addition of box plots and a number of multivariate techniques, such as factor analysis and stepwise regression.

Student were expected to include the following in their data analysis projects:

•Univariate analyses
•Data transformations, recoding, splitting into group
•Bivariate analyses
•Multivariate analyses, where applicable

Univariate analyses included simple descriptive statistics, bar charts/ histograms, and box plots. As students progressed through the examination of each variable, they made decisions about splitting variables, recoding, and so on.

*The interactive nature of the program, its ease of use, and the graphic displays make the Macintosh-StatView combination impressive.*

StatView contains a number of techniques that make exploratory data analysis simple and effective. The interactive nature of the program, its ease of use, and the graphic displays make the Macintosh-StatView combination impressive. Each graphic view within StatView 512+ has a set of "toggle" switches on the right side of the window, and clicking on one of these switches changes the view, allows change of the pattern, change of the axis label, or some other "goody."

One of the important parts of data analysis is the ability to quickly see results, transform or recode the data, examine it again, and so on. StatView is particularly useful for this kind of work, because it is simple to recode data or even to create a new data set by splitting a particular variable using one of the category (nominal) variables. Additionally, StatView allows the user to create a new variable that's the result of some arithmetic operation (+, -, *, /) between one or more variables.

Throughout the course, a distinction was made between specific instruction, guided learning, and student-originated exploration. Specific instruction generally focused on practical matters, such as how to use the StatView program, and also addressed questions about which techniques were appropriate in what instances. Guided learning was an attempt to train students by example—directing them toward certain kinds of explorations that they might not otherwise think to perform, and pointing out some of the problems and solutions. Student-originated explorations were those performed by the students themselves, based on patterns they discovered and techniques they had learned. These explorations are the natural outgrowth of the initial univariate and bivariate work. Ultimately, most of the final stages of the project were based on student-originated directions. Each student tended to take a slightly different tactic, and therefore ended up with a slightly different direction or perspective on the data set.

***Student-originated explorations were encouraged.***

Guided learning was accomplished by demonstrating what was possible and how patterns might be discovered. Two simple examples show the technique, as well as why and how StatView is useful for exploratory data analysis. Figure 1 is a histogram of the variable "height"; that is, the height of each pot measured in centimeters. Note the generally normal shape, but also note that the data are compressed at the low end of the scale, with a high value at about 30 cm; the same variable viewed as a box plot more clearly shows this individual value as an outlier (Figure 2). In fact, the case at 30 cm is a typographic error. Correction of this error results in a more expectable histogram (Figure 3) and box plot (Figure 4).

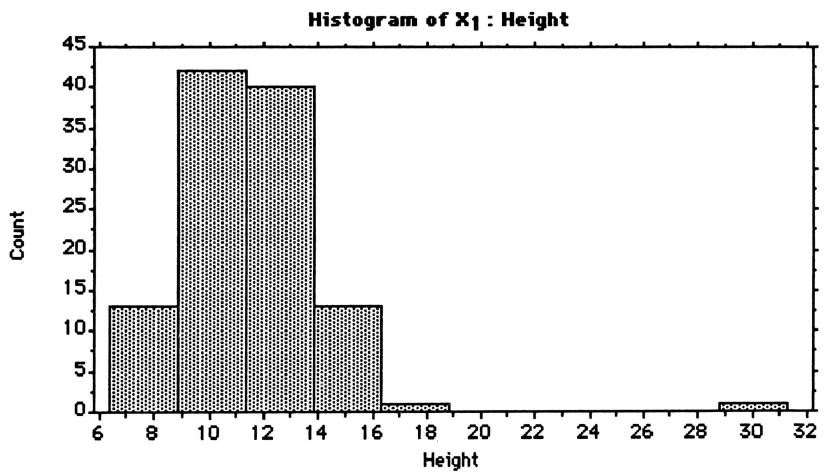



***Figure 1: A histogram of the height of each pot.***

*Figure 2: A box plot more clearly identifies the outlying value.*

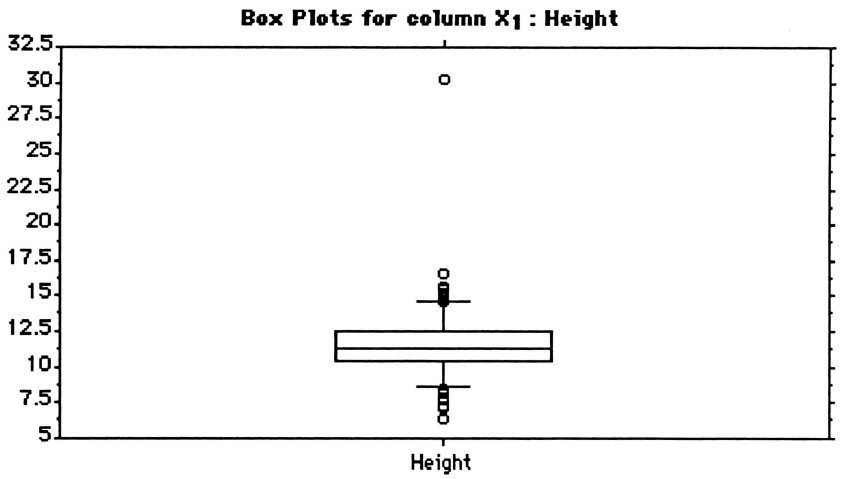
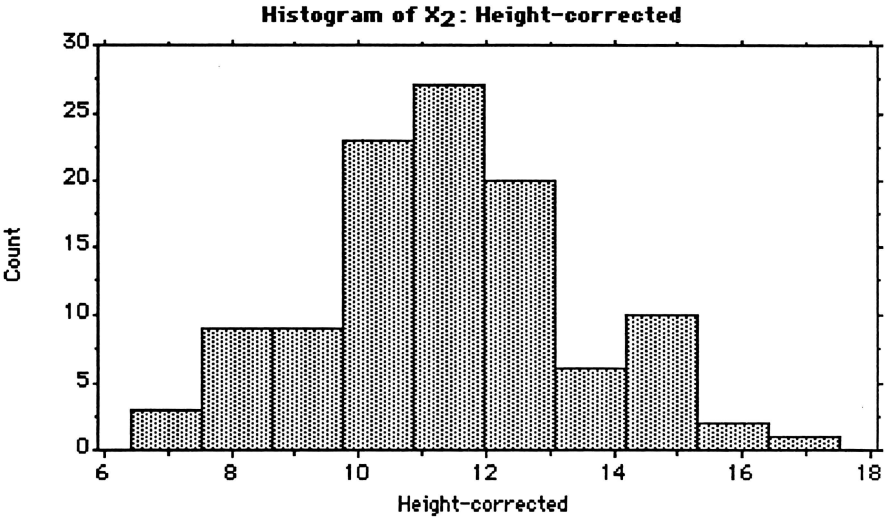



*Figure 3: The histogram was improved when the erroneous value was corrected*




Students were shown this example and, at the same time, were given directions on how to evaluate histograms and box plots for outliers and other patterns. Additionally, such examples make the skewing effect of outliers obvious to anyone.

*Simple graphic techniques can help to quickly identify errors.*

One of the simplest, but most constructive, uses for EDA is in initial data cleaning. The "height" example demonstrates how simple graphic techniques can be quickly and effectively used to determine data entry errors, or to spot other outliers that may skew the analysis and deserve attention in themselves.

The second example demonstrates why detailed data examination and univariate and bivariate exploration is so critical. Figure 5 is a histogram of volume (in liters). Although there is a small peak at about 0.5–0.75 liters, the overall distribution does not look especially unusual. One might argue that most pots are about 1.5 liters in volume, although there seems to be a separate set of smaller-

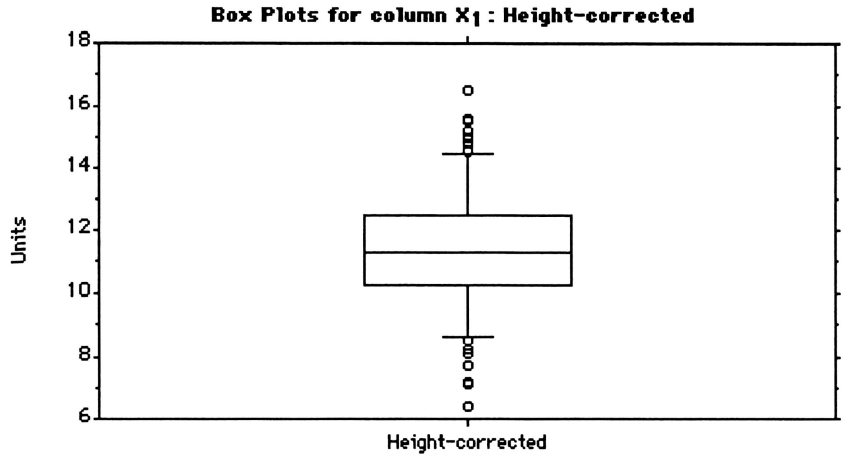



*Figure 4: The corrected box plot for height.*

volumed pots as well. However, using StatView's capability to split variables, we can take our exploration to other levels and discover previously masked patterns. Figures 6 and 7 represent the volume histograms for each knoll, or part, of the site. Figure 6 is the distribution for Knoll A pots. Volume in this portion of the site is apparently equally distributed across a range of values, from 0.5

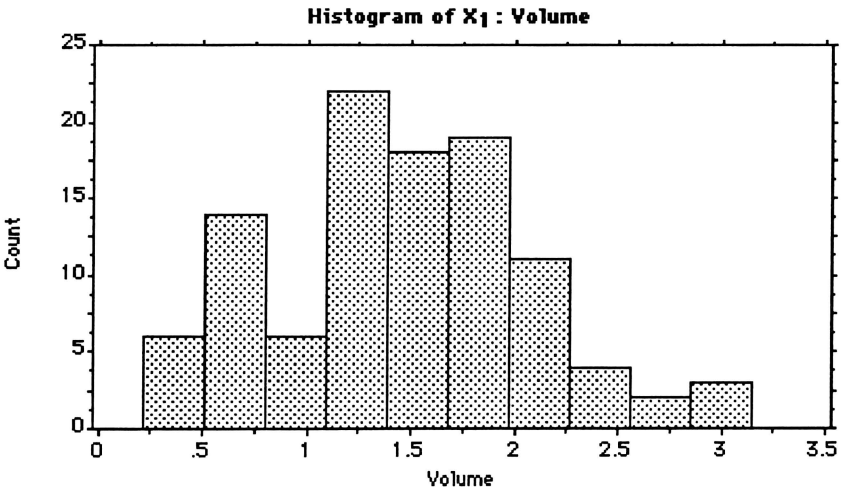



*Figure 5: The histogram for volume looks fine.*

*Figure 6: The ability to see separate plots of the variables can illustrate important differences. This is for variable A.*

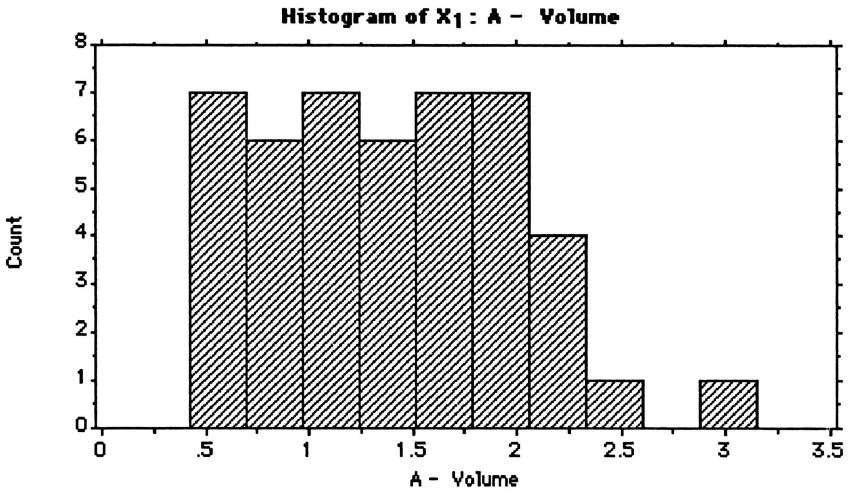
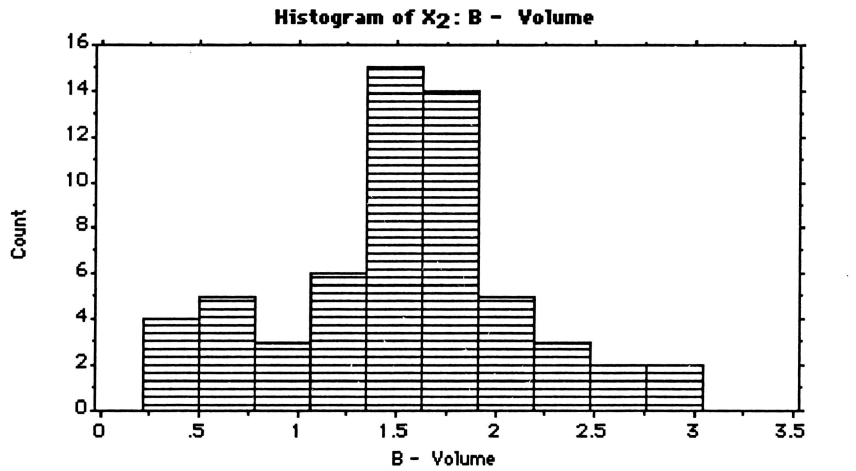



*Figure 7: The ability to split variables helps in the analysis of the data.*




to 2.0 liters. In contrast, the Knoll B volumes (Figure 7) appear nearly normal in their distribution.

## Conclusions

*Using the Macintosh computer, students were able to easily and quickly examine the data.*

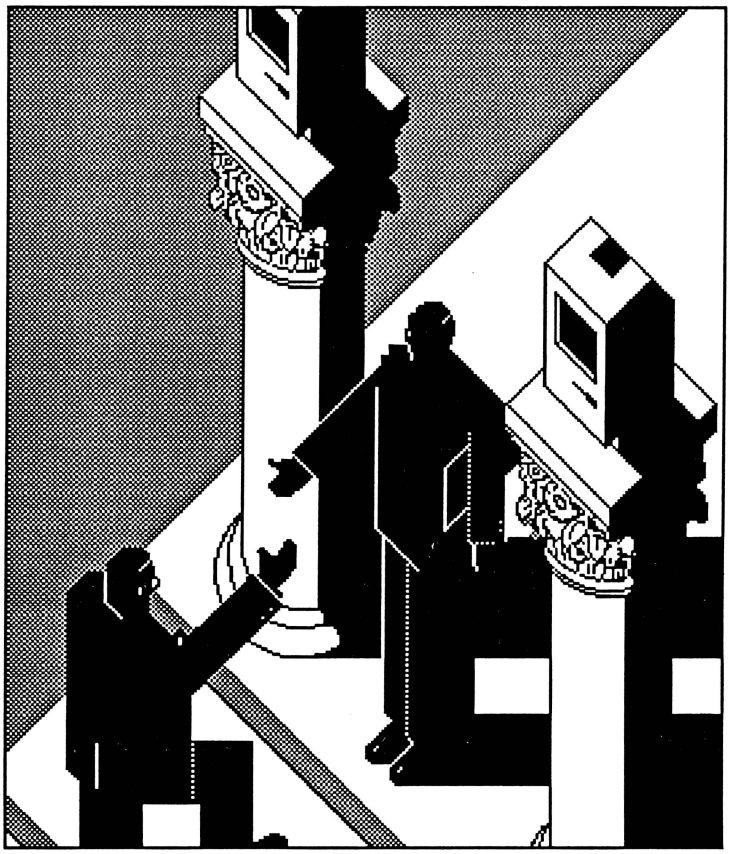
Using the Macintosh and StatView, students in this class were able to examine the data easily and quickly from a number of different perspectives. The interactive nature of the program allowed them to try many different things, and really examine and test the limits of the data. Learning time was short, and feedback was immediate.

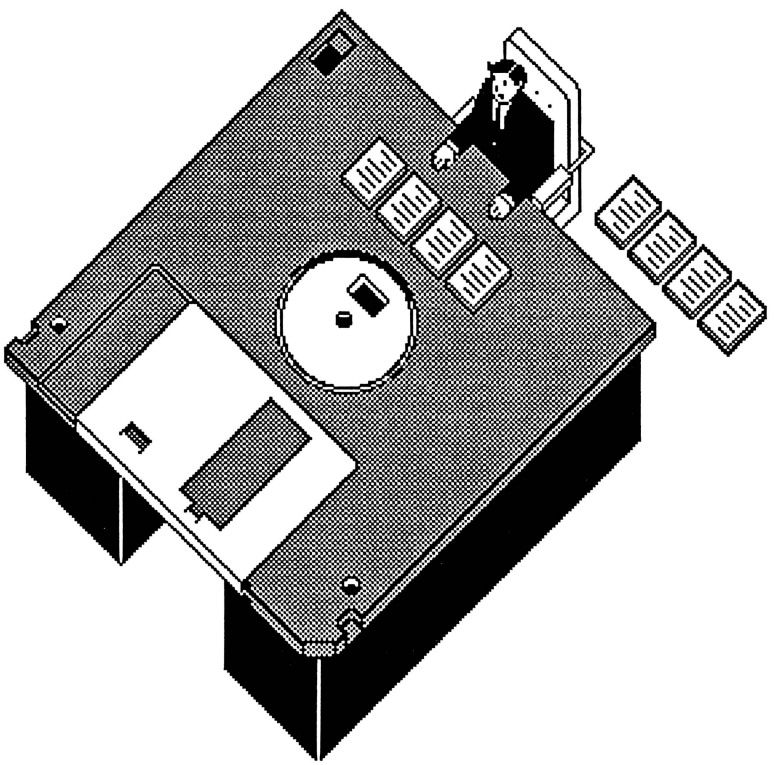
*Students found that their experience had contributed to their understanding of how to work with data on the mainframe.*

Interestingly, because of their experience in data analysis, students found subsequent work using SPSS and the mainframe simpler and less frustrating. Several students also commented that since they knew which things "went together" and how each variable behaved, the results of the multivariate analyses they had completed often were predictable, and even seemed redundant and obvious. Students were surprised at how much of their analysis was actually

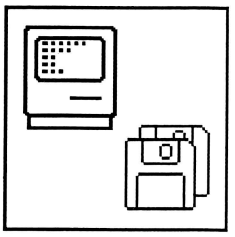
completed at the univariate and bivariate levels. They had fully explored the data set, and had a clear perspective of its peculiarities and patterns. Although the students sometimes made poor decisions in terms of the particular techniques they chose for analysis of particular sets of variables, in each case they "discovered" the problems themselves, simply because they had the knowledge that their familiarity with the data provided. That is, they had clearly and fully met the objectives of the course.

Students in this course now have a good perspective on data analysis. The course worked especially well in providing that training, and the success seems to stem from using the same data set throughout the class for all techniques, and from using StatView 512+, a package that provides the tools for anyone to painlessly learn the art of data analysis.





# Macintosh Products



The **Macintosh Products** section will feature brief descriptions of products that are of interest to the academic community. Some of the products will be specifically concerned with the theme of the current *Wheels for the Mind* issue, while others will be of more general interest.

Please send in your suggestions for features that might be of interest to those in the academic community. In this issue, we will be looking at products that assist in grade keeping and testing.

## MicroGrade: Grade Keeping on the Macintosh

One of the most difficult tasks facing an instructor is to keep up with the grade-keeping process. Establishing grade parameters, posting scores, providing progress reports to individual students, and calculating final grades can be a burdensome task for the instructor with a heavy class load.

MicroGrade is designed not only to simplify these tasks, but to give the instructor greater flexibility in planning his or her course structure and grading parameters.

MicroGrade represents a departure from typical "gradebook" software packages. The unique windowing capability of the Macintosh allows the instructor to view four elements of the grade-keeping process simultaneously. MicroGrade makes full use of the Macintosh user interface.

***MicroGrade can keep track of up to 100 assignments for 350 students.***

The program allows instructors to develop their own course structures and grading standards. There is a maximum class size of 350 students, and the program will accept scoring information for 100 individual assignments.

Once you become familiar with the design of MicroGrade, you'll be able to take advantage of the following features:

- MicroGrade lets you track up to 100 assignments within 8 assignment cateogories.
- Student names and other pertinent data (phone number,

address, and so on) are easily entered and maintained. The maximum class size is 350 students.

*Grades can be "curved" if appropriate.*

- Grade standards (for example, A=90%, B=80%, C=70%) are flexible. You can adjust them at any time to correct for a "problem" exam or to determine the effect of a new grading curve on student scores.

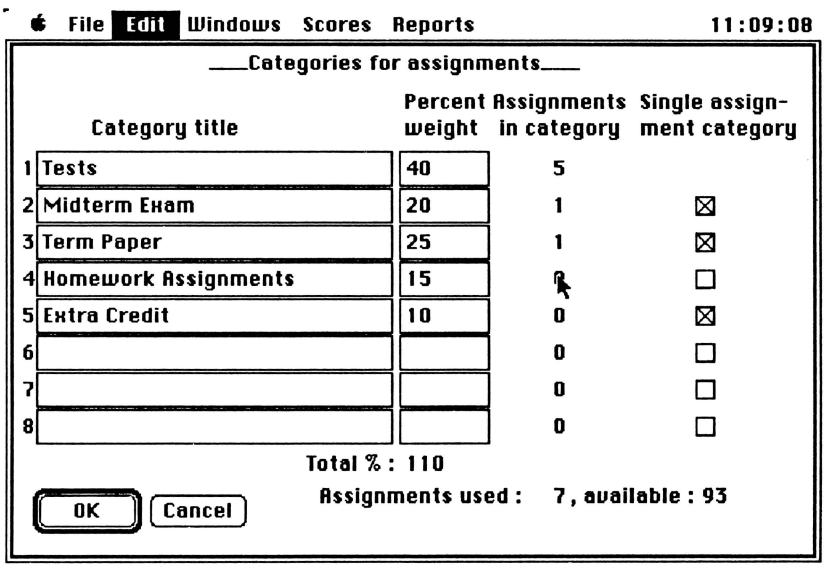
*Class rosters and statistical summaries can easily be obtained.*

- Printed reports include a traditional gradebook format showing all students and their scores on all assignments. Other reports include class rosters, individual student reports for counseling purposes and a statistical analysis of class performance.

### Designed for maximum flexibility and ease of operation

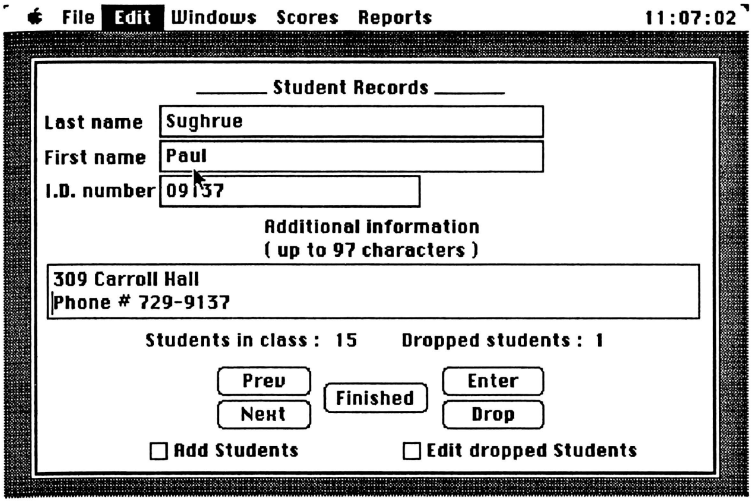
MicroGrade allows you to develop your course structure to meet your specific needs regardless of subject area and grade level. A total of 100 individual assignments can be established in 8 categories. You can enter the maximum score for each assignment, and weigh it to its value in the category. The program also provides the option of dropping low scores.

*Assignments can be given different weights in determining a student's final grade.*




### Student records are easily entered, maintained, and updated

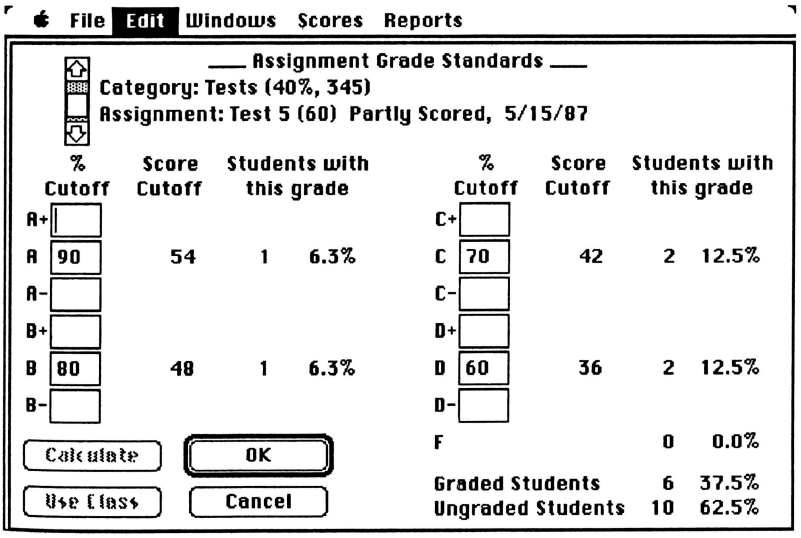
MicroGrade lets you enter records for up to 350 students per class—complete with ID numbers and personal information. ID numbers can be assigned or computer generated. Add or drop students at any time; information about dropped students is retained, and students can be reinstated if desired. A running total is kept of the number of students in the class.




*Student records can contain additional information that may be helpful to the instructor.*

## Set up grade standards for final grades and for each assignment

Enter a percent cutoff figure next to each letter grade, and MicroGrade automatically calculates related point cutoffs. The number of students and the percentage of the class receiving each letter grade are displayed. Grade standards can be changed at any time; immediate feedback on changes in grade distribution is provided so you can judge the effect of the grade standard changes on overall student scores.

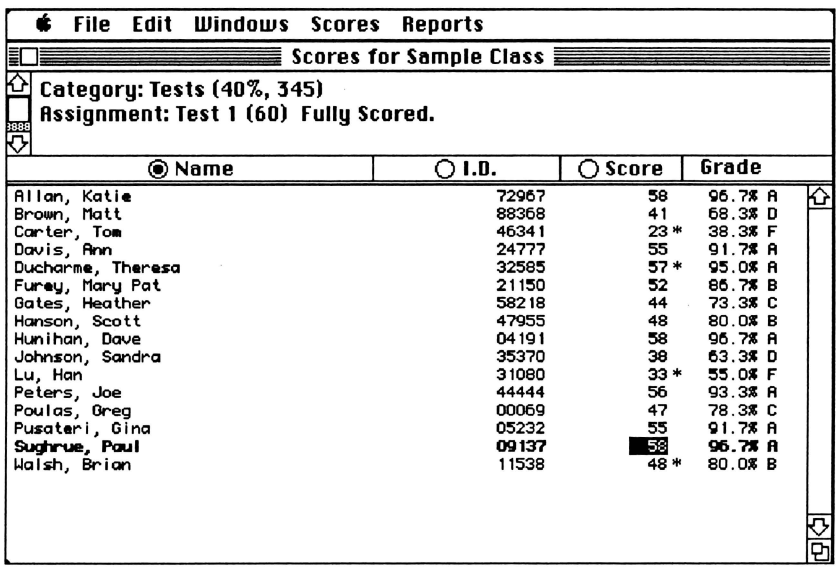



*Final grades and cutoff points are automatically calculated.*

### Streamline the tedious tasks of entering scores and grade calculation

MicroGrade provides numerous methods for accessing individual student records, so there's no need to sort or alphabetize student papers to enter scores; letter grades and percentages are automatically displayed. On-screen indicators are provided for excused and incomplete scores. As an extra security feature, changed scores are marked with an asterisk.

*Alphabetized class lists can be printed.*




# MicroTest II: Computerized Test Generation for the Macintosh

*With MicroTest II, an instructor can create, refine, update, store, and print a variety of tests.*

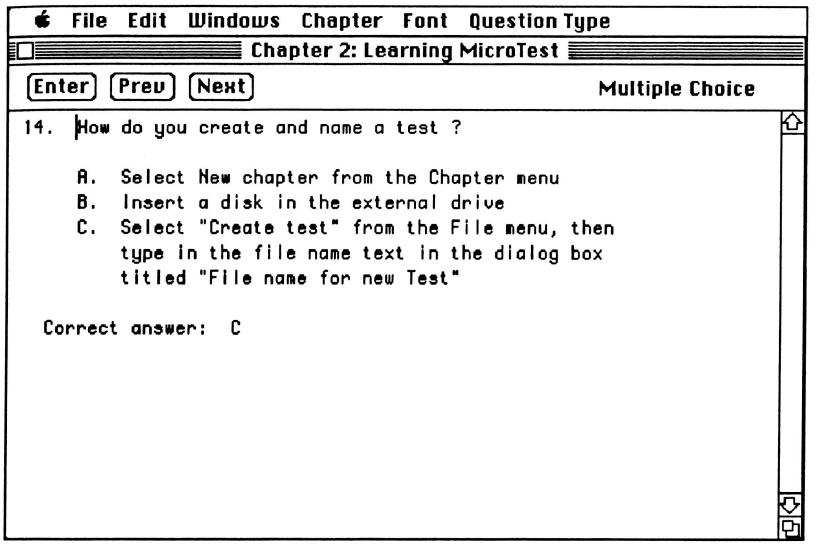
One of the most difficult tasks of education is evaluating what has been learned. Test design can be difficult and time-consuming, but MicroTest II makes the process relatively easy. With the Macintosh version of MicroTest II, an instructor can create, refine, update, store, and print a variety of tests from his or her files or from materials provided by publishers.

MicroTest II is a test generation-program designed primarily for post-secondary educators. The program allows an instructor to create a data bank of questions (or use one provided by a textbook publisher) and select questions to be included in printed exams. MicroTest II can be used to create up to three different test versions with separate answer keys. It allows an instructor to include heading information, print exams with as many as 250 questions, and more.

MicroTest II offers the following features in its test-item bank function:

- It lets you build a file of up to 10,000 questions per course.
- Preformatted screens simplify question entry.
- Test-item banks are organized in a book/chapter hierarchy that's flexible enough for your unique testing needs.
- It provides full-screen editing using the mouse. Add, delete, and edit questions at any time.
- An options screen lets you select the basic layout for test questions.

*A data bank of up to 10,000 items can be prepared.*

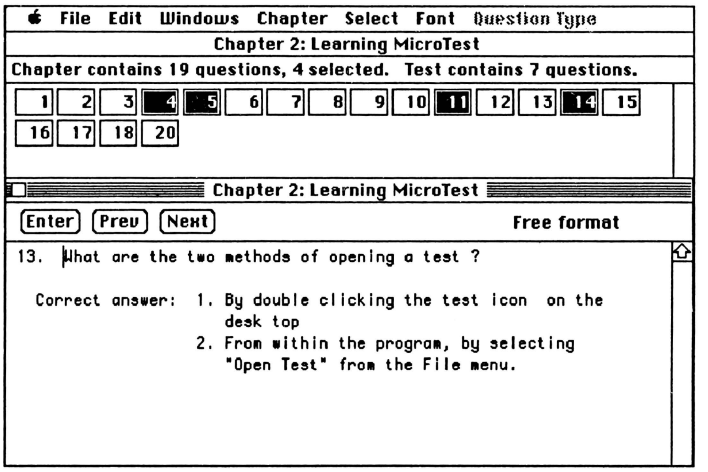



*Questions, choices, and answers are entered directly into a window.*

When you create your test, MicroTest II offers these features:

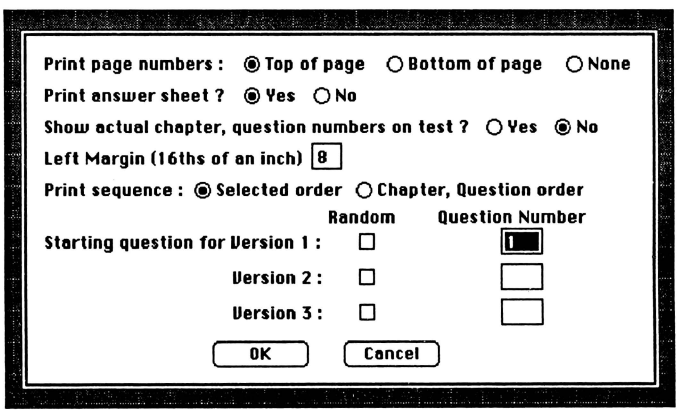
- Tests can contain up to 250 questions.
- You can select questions by chapter using a numbered grid, or split the screen and select while previewing your question file.
- You can select questions from any number of chapters for comprehensive exams.
- The system keeps track of the total number of questions in the test and number of questions from each chapter.

*The instructor can select those questions that will be included on a test.*

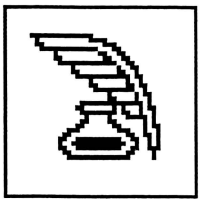



When you print your test, MicroTest II lets you:

- Include printed instructions to print on every page or only on the first page.
- Print up to three different versions (with separate answer keys) to discourage cheating.
- Use automatic page and question answering; won't split questions between pages.
- Interface with MacPaint/MacWrite for extensive editing or addition of graphics.



# News and Notes



The **News and Notes** section contains information of general interest to those in the Macintosh community. In this issue, you will find an announcement of the 1987 Wheels for the Mind Competition by Apple Computer, and a summary of activities at a recent medical conference. If you have information or know about events that you feel might be of interest to the general Macintosh community, please send your news along.

## 1987 Wheels for the Mind Competition

**Apple University Consortium**
**Awards for Excellence in Academic Computing**

Apple Computer is pleased to announce the Academic Achievement Awards for Excellence. These awards have been instituted to recognize excellence and innovation in educational applications of microcomputing technology.

A complete description of the program follows. Winners will be announced in spring of 1987.

### Why?

*Awards have been established to recognize the innovative use of Apple products in higher education.*

To recognize excellence and innovation in the use of Apple products in higher education. These are awards for outstanding educational applications that have been developed and are already in use at one or more institutions of higher education. Examples of eligible educational applications include (but are not limited to) courseware, communications applications, publishing aids, productivity tools, networking applications, and "special achievements."

### Who?

- Faculty members, staff, and students of any accredited two- or four-year institution of higher education in the United States are eligible.

- Members of noncommercial and nonprofit organizations affiliated with these institutions are also eligible.

*Who is eligible for an award?*

- The application/entry must be authored by a faculty member, staff member, or student, and must be not-for-profit.
- The application must run on/work with an Apple product from the Apple II or Macintosh product family.
- It must be "shareable," that is, available to others on a no-cost or at-cost basis.
- The application must have been in active use for at least one quarter/semester before the time of submission, and not still in the planning or development stages.

*How do I know if my application qualifies?*

- Applications using commercial products developed outside of an institution of higher education will be accepted, but entry of the commercial product itself will not.
- The entry must be accompanied by an essay (not more than two pages, please) *and* supporting materials (disks, photos, and so forth) describing how the nomination meets the overall judging criteria.
- Employees of Apple Computer are not eligible.

**The following are the categories of eligible entries:**

*There are several categories for eligible entries.*

**In-Class Instruction**
These are tools associated with the demonstration or presentation of materials by an instructor. Examples include demonstrations, simulations, monitoring, and interactive aids such as on-line instructor feedback.

**Teaching Tools**
These are tools used *outside* the classroom, but associated with a specific course. Examples include fieldwork, exams, data analysis, labs, simulations, programming aids, and tutorials.

**Study/Research Tools**
These are tools that offer general help to students, faculty members or staff. They are not associated with a specific course. Examples include library search, word-processing, productivity, spreadsheet, desktop communications, desktop publishing, networking, and research tools.

**Development Tools**
These are tools for developing academic applications, courseware, or other educational aids. Examples include authoring tools, expert systems, and presentation aids.

*Enter yourself or nominate someone else.*

**Special Achievements**
This is a category for those activities that may not fit "neatly" into any of the preceding categories. Examples might be for organizing a User Group, faculty training programs, meetings, publications... something "special."

**Who Decides?**

Judging will be conducted by a panel of seven: three faculty members, two people involved with campus computing services, one student, and one Apple employee.

**How?**

Each entry will be judged on whether it:

*All decisions of the judges are final.*

- is a completed work;
- advances or demonstrates new uses of the technology in education;
- improves the learning and/or teaching process;
- is easy to use;
- aids in learning effective problem solving;
- is shareable;
- is an example or resource upon which others may build; and has been evaluated after use by the institution and/or author.

*$50,000 in awards will be presented in the spring.*

**$50,000 in awards will be presented, with no single prize to exceed $5,000.**

Awards will be made at a special presentation in spring 1987.

**Please use the official submission form in the back of this issue of *Wheels for the Mind.***

# Macintosh in the Health Sciences

A Macintosh in the Health Sciences conference was held June 26–28 in Memphis, Tennessee, to focus on developments with Macintosh use in the area of medicine and health. The meeting was sponsored by the University of Tennessee, Memphis, and Apple Computer, Inc.

The meeting began with a reception and continued through the next two days with opportunities for hands-on experience and third-party developer demonstrations. The first general session covered topics such as personal productivity workstations, office automation in a clinical setting, implementing faculty support systems for developing instructional applications, and incorporating Macintosh into the campus computing strategy. A series of "breakout" sessions focusing on specific topics followed.

The following is a list of the presenters and presentations. In some cases, there is also a brief description of the presentation.

**The UT Memphis: Information-Intensive Environment**
James C. Hunt, M.D., Chancellor
University of Tennessee, Memphis

**The Faculty Personal Productivity Workstation**
Thomas Abdella, M.D., Dept. of Obstetrics and Gynecology
University of Tennessee, Memphis

**Office Automation in a Clinical Setting**
Robert Gold, M.D., Dept. of Radiology
University of Tennessee, Memphis

Dr. Gold described the evolution of his department's office automation. The group began using dedicated word-processing people. This was expensive, had a high turnover rate, and demanded a very time-consuming training program. The setup offered no spreadsheet capabilities and very primitive graphics capabilities, as well as limited storage and data-sharing abilities. By adding IBM PCs and Hewlett-Packard microcomputers, the department added spreadsheet and some graphics capabilities, but the system still required extensive training and was very expensive for networking and sharing peripherals.

***Macintosh Plus computers have dramatically improved the quality of output.***

Now the group has moved to having 10 Macintosh Plus computers, 3 ImageWriter II printers, an Apple LaserWriter printer, and 6 hard disk drives. This has dramatically improved the quality of output, promoted in-department slide production, and encouraged extensive use of graphics in presentation materials and grants. Software used is MacWrite, MacPaint, MacDraw, and various spreadsheets, data bases, and graphing programs.

Future possibilities include linking departments with electronic-mail capabilities, file servers, networks and bridges, faster and larger hard drives, and high-resolution digitizers and optical character readers.

**Implementing Faculty Support Systems for Developing Instructional Applications**
Raoul Arreola, Ph.D., Dept. of Education
University of Tennessee, Memphis

**Incorporating Macintosh as Part of a Campus Computing Strategy**

Edmund Bibisi, M.A., Dept. of Computer Science
University of Tennessee, Memphis

Howard Ramagli, Ph.D., Dept. of Computer Science
University of Tennessee, Memphis

John Silver, D.V.M.
University of Tennessee, Memphis

These three gentlemen discussed UT Memphis's campus computing strategy and its implementation. The objective at UT Memphis is to provide access to a wide variety of computing resources in the easiest and most efficient way possible. This view takes into account the importance of both low-end and high-end workstations and minicomputers.

The school is accomplishing this through development of a local area network that supports broadband and Ethernet capabilities and allows access to any device connected as a node. There are gateway capabilities to other networks, and the whole network is being developed to be fast, open, and transparent to all users.

***The Macintosh computer is being used for terminal emulation and data transmission.***

Macintosh computers are being used for terminal emulation and data transmission on the network, in addition to their work as versatile and sophisticated personal workstations for faculty. Future directions include a lab to test gateways and bridges from AppleTalk to other networks, acquisition of MacWorkstation for front-end use on the VAX and PDPs, testing of data transmission and file transfer protocols, and exploring the potential of a medical information network with UT Memphis serving as the hub for medical information and data exchange.

**Breakout Sessions**

**Using the Macintosh in the Laboratory**

Thea Tlsty, Ph.D., Lineberger Cancer Research Center
University of North Carolina

**Developing an On-Line Data Base: AppleLink as a Case Study**

Kathi Kaplan, Apple Computer, Inc.

**Curriculum Integration of Microcomputers**

Charles Bottoms, Ph.D.
Dartmouth Medical School

**Macintosh as a Tool for Patient Education**

Jay Marian, Ph.D.

Washington University

**Quality and New Computerized Tools: Hospital-Wide Quality Assurance; Medical Record Availability and Security; Patient Acuity and Staff Tracking**
Timothy Rosio, M.D.
Texas Tech Health Science Center

**Developmental Partnership Between the University and Medical Center**
Dr. Hank Baily
Bloomsburg University

Dr. J. Robert Burns
Geisinger Medical Center

*Computer-based interactive videodiscs can improve the learning process.*

Drs. Burns and Baily discussed a project involving development of a health care CBIV (Computer-Based Interactive Videodisc) learning system related to critical-care medicine. The model will include a reference system, "How to" lessons, and case simulations.

The scope of the project includes TV services, videotaping and editing, instructional design, graphics, and programming in a series of on- and off-campus projects. This project is aimed at improving university teaching, retraining business-sector employees, and furthering the partnership among education, business, and government through the use of high technology.

**Videodisc and the Macintosh**
Bruce Robertson
Edudisc Corporation

Robertson described two packages from Edudisc that allow instructors to create their own courseware and curriculum using Macintosh and videodisc integration. Medical applications include diagnostic exercises, lessons, CT and X-ray files, public health, patient records, image archiving, lab simulations, microscopic slides, and on-line reference capabilities.

Edudisc can put together the complete hardware and software configuration necessary to design the best system for each user.

**Omnis 3 Hands-On Session**
Jeff Galvin
Blyth Software

**Ultrasonic Typing, Music, and Art: Macintosh and the Paraplegic**
Andy Schoenberg

University of Utah Medical Center

**Macintosh in the Classroom**
Art Straughn, M.D.
University of Tennessee, Memphis

**Macintosh and Medicine: Considerations of Development, Use and Implementation**
Douglas Chute, Ph.D.
Drexel University

*MacLaboratory is an introductory, interactive psychology course.*

Dr. Chute discussed several considerations involved in the use of Macintosh in medicine. These included software design, teaching applications, research applications, clinical applications, and the computing environment. He illustrated these concepts with MacLaboratory, an introductory interactive psychology course being used at Drexel. This course has been rated by students as one of the most valuable and enjoyable courses in their experience.

The course consists of several sections: perceptual and motor skills, neuropsychology of the central nervous system, problem solving, hemispheric function, polygraph, reaction time, pitch discrimination, tone generator, Megaroids, Anatomizer, neural modeling, and a survey questionnaire and data summary.

**Macintosh as a Physician's Tool**
Timothy Rosio, M.D.
Texas Tech Health Sciences Center

**Campus Networking and Datacomm**
Margie Dietz, Duke Medical Center
Dr. Jim Blaine, Washington University
Martin Haeberli, Apple Computer, Inc.

**The Challenge of Developing Computer Literacy Courses in the Medical Curriculum**
Curtis Wise, Ph.D.
Medical University of South Carolina

**MacPath: An Interactive Videodisc System for Teaching Pathology**
Steven M. Erde, Ph.D. Cornell Medical School
Daniel R. Alonso, M.D. Cornell Medical School
Andy Diamond, Cornell Medical School

**Developing Effective Learning Programs**
Roy Peterson, M.D.
Washington University

Dr. Peterson gave an overview of how to go about developing a Macintosh-aided teaching program using commercially available software. Questions that need to be addressed in this undertaking include: "What are the orientations of the material to be taught/learned?" "What is the general character of the learning process?" and "What kinds of concepts are to be learned?"

The next step is to select the appropriate software to be used. He illustrated this discussion using Fundamentals of Human Embryology as an example course. In this course, he used VideoWorks to illustrate human embryology development.

**Macintosh to Enhance Patient Education**
Anne Andrade
Brown University

Andrade described a program developed at Brown called Personal Choice—A Guide to Selection of Birth Control. She described how this first in a series of health education programs is being integrated into the Health Service Center at Brown. A more complete description of this appears in the summer issue of *Wheels for the Mind.*

**The Macintosh as a Clinical Research Tool in the Operating Room**
Robert Kalayjian, M.D.
Duke Medical Center

**Macintosh as a Workstation on Networks to Mainframes**
Edmund Bibisi
University of Tennessee, Memphis

Martin Haeberli
Apple Computer, Inc.

**BenchTop Software: Interfacing Scientific Equipment**
Gary Schlickeiser
Reed College

Schlickeiser talked about The BenchTop Instrument—a laboratory interface designed for data acquisition and apparatus control in both scientific research and classroom instruction of laboratory methods and concepts.

**Knowledge Coupler Hands-On Session**
Phil Bushby, D.V.M.
Mississippi State University

**MacSpin: 3D Graphical Data Representations**
Andrew Donoho
D2 Software

**Macintosh in Research Applications**
Mel Park, M.D.
University of Tennessee, Memphis

**Distributed Data System for a Multicenter Epidemiology Study**
Dennis Black
University of California at San Francisco

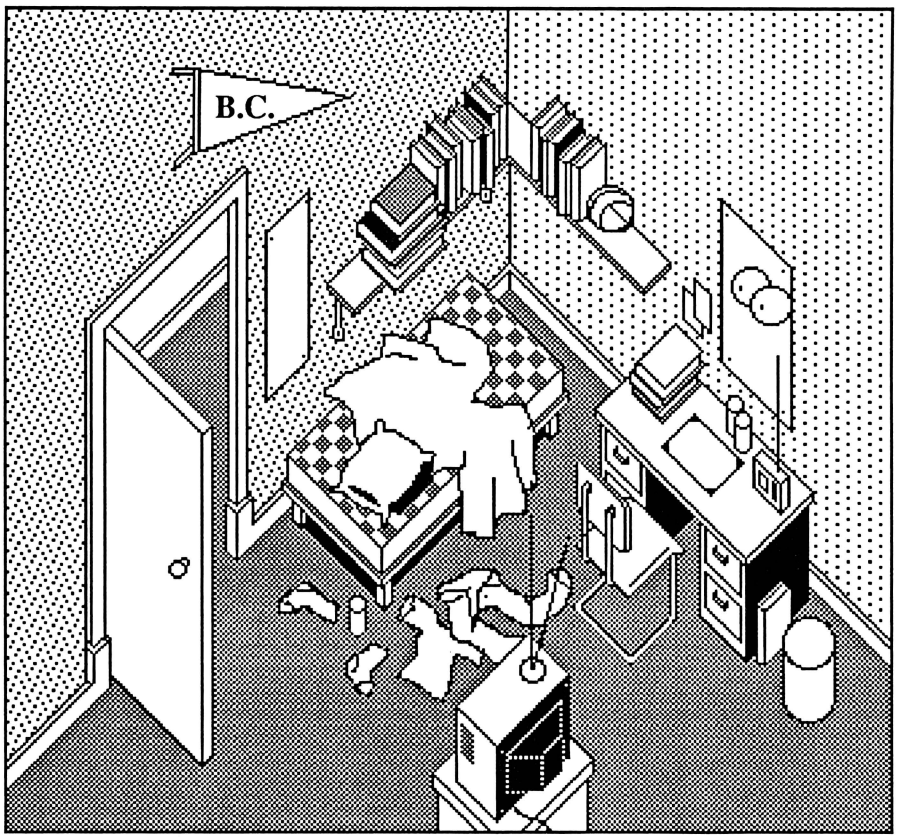
*Information on 10,000 patients will be entered into a data base.*

Black is using Macintosh Plus computers, 20Mb hard disks and the Omnis 3 Plus data base to develop a distributed data processing system for a major epidemiologic study of hip fractures and osteoporosis. The study will involve 10,000 patients, and the technology will allow four clinical centers to enter and edit data that they collect on these patients, as well as do follow-up work. Macintosh can also be used by patients themselves to input information and receive health education relevant to the survey.

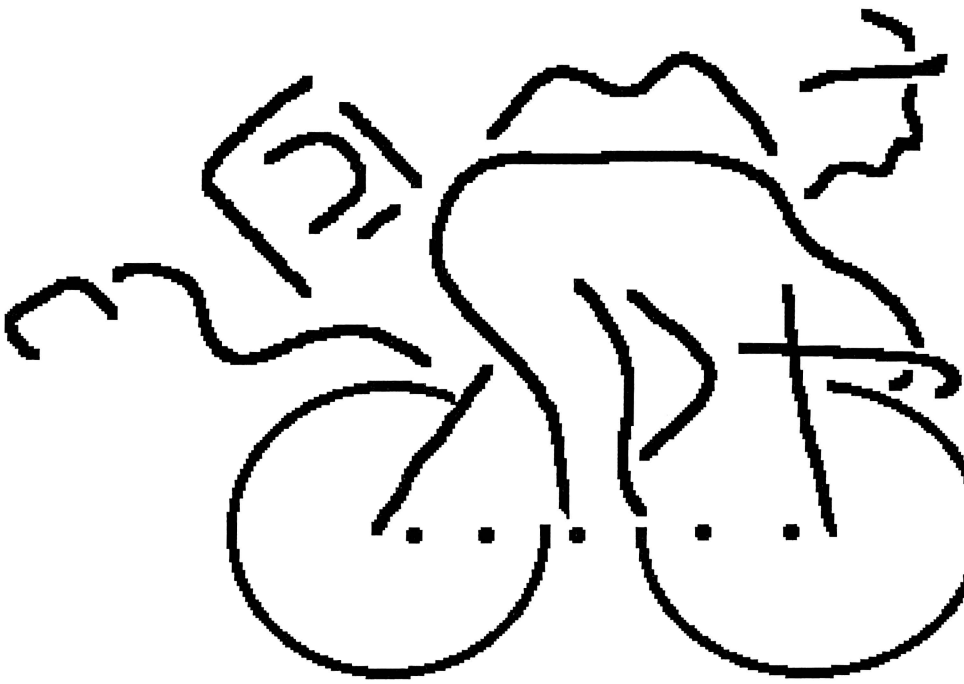
**Using the Macintosh in a Medical School Admissions Office: Automated Data Input and Multiuser Systems for Tracking Applications**
Daniel R. Alonso, M.D.
Cornell Medical School

**Health Science Presentation Graphics**
Aldus Corporation, Abaton

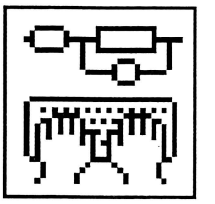
**Decision-Maker Hands-On Session**
Al Latart
Dartmouth College




Is your dorm room this clean ?



# Technical Information



The **Technical Information** section will present articles that are of a more technical nature than those in other parts of *Wheels for the Mind*. Here is where you might find information about new upgrades, technical references, and programming topics.

This particular issue contains a description of the Finder and System software that you should be using with various Macintosh configurations. In addition, there is an article that describes how to make any necessary System software upgrades.

## Macintosh System Software

Macintosh System software has been updated to enhance performance of the Macintosh and fix several user-visible bugs in previously released versions.

***Are you using the latest System software with your Macintosh computer?***

The new System software is appropriate for use on Macintosh computers with at least 512K RAM, and use with all LaserWriter and ImageWriter printers. A complete list of compatible hardware follows:

Macintosh 512K
Macintosh 512K upgraded with the 800K internal disk drive and new ROMs
Macintosh 512K Enhanced (comes with 800K internal disk drive and new ROMS, but MacWrite and MacPaint are not included)
Macintosh Plus
Macintosh XL
800K External Drive
Hard Disk 20
LaserWriter
LaserWriter Plus
ImageWriter
Wide-Carriage ImageWriter (15")
ImageWriter II
ImageWriter II with AppleTalk Option Card

*These are the latest version numbers for the Macintosh System software.*

Here are the official version numbers. Also listed are the previous version numbers that the new software replaces:

| File | Version | Supersedes |
|---|---|---|
| System | 3.2 | 3.1.1, 3.1, 3.0, 2.1, 2.0 |
| Finder | 5.3 | 5.2, 5.1, 5.0, 4.1, 1.1g |
| ImageWriter | 2.3 | 2.1, 2.1, 2.0, 1.0, Imagewriter 15" 1.0 |
| AppleTalk ImageWriter | 2.3 | 2.2, 2.1, 2.0 |
| LaserWriter | 3.1 | 3.0, 1.1, 1.0 |
| Laser Prep | 3.1 | 3.0, 1.1, 1.0 |
| Hard Disk 20 | 1.1 | 1.0 |
| Installer | 2.2 | 2.1, 2.0 |
| Font/DA Mover | 3.2 | 3.1, 3.0, 2.5, 1.0 |
| The Namer | 2.1 | 2.0, 1.0 |

Macintosh 128K users must use the following configuration:

| | |
|---|---|
| System | 2.0 |
| Finder | 4.1 |
| ImageWriter | 1.0 |

**Booting a disk**

Merely downloading the System and Finder to a disk does not make that disk bootable; a disk requires special information in its "Boot Blocks" before you can boot it. A newly formatted disk lacks this information. When you insert this disk into a Macintosh and attempt to boot up, it is automatically ejected and an "X" appears on the disk icon.

To make the disk bootable, format a new disk and Finder copy a bootable System file to it. Trash that System file, then download the new System and Finder to the new disk.

**Where do you get the new software?**

There are several places to obtain the new system software.

First, see the resale center or computer center on your campus. It will probably have the new software and Installer and be able to update your disks. Second, every authorized Apple dealer will also have the new System software. Just stop in or make an appointment to update your disks.

Finally, if you have an AppleLink™ address, the software can be found in the Macintosh System Software Folder under the "News" icon on AppleLink.

Be sure to update *all* of your startup disks or your Hard Disk 20 with the new software. It will enhance the performance of your

equipment, making it easier than ever to do your work. With the new software, any Macintosh with 512K or more of RAM and peripherals will function consistently, no matter *where* on campus they may be found.

## Possible Configurations

| | |
|---|---|
| 128K Macintosh<br>ImageWriter<br>400K external drive | System 2.0, Finder 4.1,<br>ImageWriter 1.0 |
| Macintosh 512K<br>400K external drive<br>ImageWriter II | System 3.2, Finder 5.3,<br>ImageWriter 2.3 |
| Macintosh 512K<br>400K external drive<br>LaserWriter | System 3.2, Finder 5.3, LaserWriter 3.1, Laser Prep 3.1, The Namer 2.1 |
| Macintosh 512K Enhanced<br>Hard Disk 20<br>ImageWriter II | System 3.2, Finder 5.3, ImageWriter 2.3, Hard Disk 20 1.1 |
| AppleTalk network with<br>Macintosh 512K;<br>Macintosh Plus systems<br>with Hard Disk 20, and two<br>LaserWriter printers | System 3.2, Finder 5.3,<br>Hard Disk 20 1.1, LaserWriter 3.1,<br>Laser Prep 3.1, The Namer 2.1 |
| Macintosh Plus<br>Hard Disk 20<br>ImageWriter II | System 3.2, Finder 5.3,<br>Hard Disk 20 1.1, ImageWriter 2.3 |
| Macintosh Plus<br>800K External Drive<br>ImageWriter II with<br>AppleTalk card | System 3.2, Finder 5.3, AppleTalk<br>ImageWriter 2.3 |
| Macintosh 512K, upgraded<br>with 800K internal disk<br>drive, 400K external<br>drive, ImageWriter | System 3.2, Finder 5.3,<br>ImageWriter 2.3 |
| Macintosh 512K<br>800K External Drive<br>ImageWriter II | System 3.2, Finder 5.3,<br>Hard Disk 20 1.1, (to use the<br>Hierarchical File System),<br>ImageWriter 2.3 |

***Prepare yourself for any of the Macintosh computer setups you may encounter on campus.***

# Understanding and Upgrading Your System and Finder

By Andy Reese
© 1986 Apple Corps of Dallas

*The following article was submitted by Andy Reese of the Apple Corps of Dallas. The original title was "Help For the Confused Mac Owner." It is a very helpful piece and is, essentially, reprinted here in its entirety.*

## The System Folder explained

***Have you ever wondered what all those items in your System Folder were used for?***

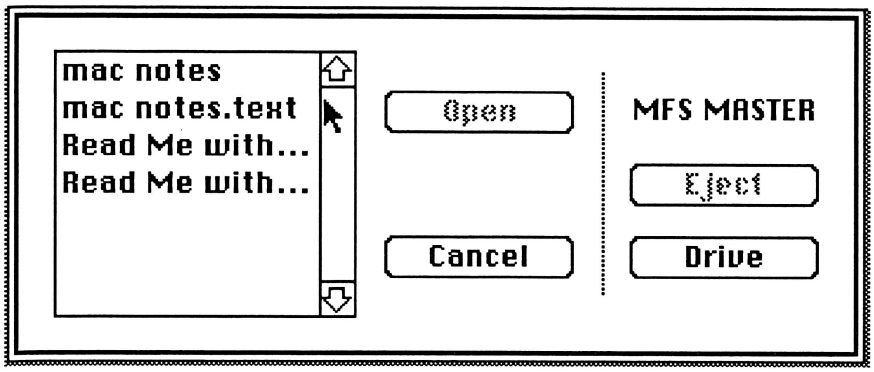
In order to get a Macintosh up and running, you must insert a disk with a System Folder on it. What happens when you "boot up" the Macintosh, and what are all those things in the System Folder? When you boot the Macintosh, it first runs a memory test, and then loads the application called the Finder. The Finder requires information from the System file before it can present you with the desktop.

## Finder

To help you understand how the Macintosh works, let's compare the Macintosh to a hotel. In a hotel, you have a front desk, which is the information center. This is where you check in and out, messages are relayed, and track is kept of which rooms are full and which are still available.

The Finder does much the same things. It keeps track of which disks are currently in the drive and which ones are out, and what programs or documents are available on the disks. The Finder lets you know how much room is available on each disk. It will also let you move applications or documents from one disk to another or throw them in the trash can.

A hotel has certain periods that require lots of information to be available and other times that are slow. Let's say that the slow time is from 10 P.M. to 7 A.M. During that time, a hotel will have a light staff to handle the front desk. Similarly, there are periods when the Macintosh requires only limited information to be available. An example of this is if you load MacWrite and are in the process of opening or saving a document. For "light information" tasks such as these, you get the MiniFinder, which is the "night-duty operator" on the Macintosh. It will list the disks and files that are available, but will not let you copy files from one disk to another or throw anything away. Here is an example of the night duty clerk/Mini-Finder:




## The System file

The hotel has a storeroom or cabinet of some sort where the staff store items that are needed by guests: room keys, towels—those plastic cups and soap that you always take home with you. This storeroom can be compared to the System file on the Macintosh.

*All your fonts and desk accessories are stored in the system file.*

OK, you're at the Hotel Macintosh, and you call the front desk to complain that your ice bucket is missing. So a member of the staff goes to the storeroom, gets an ice bucket, and brings it to you. It may be any staff member; they all have access to the storeroom. This is similar to what happens when you use your Macintosh. Virtually all programs are calling and requesting items that they need for operation. These items are all found in the System file. Some examples are all your fonts and desk accessories (the items found when you click on the apple in the menu bar). If something should happen to your System file, your programs will start complaining with little alert boxes—or worse, with bomb messages. Just as a hotel cannot operate smoothly or efficiently without a well-kept storeroom, the Macintosh cannot operate without a good, clean System file.

## The Clipboard and Scrapbook files

The Clipboard is the area that stores information any time you use the Cut or Copy command in a program. Usually this information is only needed at the moment; you cut one sentence out of a MacWrite document and then paste it in a later paragraph. Once you have completed your MacWrite document, you probably don't need that sentence again, but it will be stored in the Clipboard file until you do another Cut or Copy.

The *TV Guide* in your hotel room provides a good analog of what the Clipboard and Scrapbook are to the Macintosh. With the *TV Guide*, you need it for the current evening's listings, but in the morning, you have no need for last night's listings. You can throw the Clipboard in the Trash if you do not need the information or want to clean up the System Folder. Just be aware that the next time you Cut or Copy, the system will create a new Clipboard file for you.

The Scrapbook is a little different, in that it retains information that you may want to keep for a while or use in other applications. This would be similar to finding an article in the *TV Guide* that you really like and want to keep for future reference. Instead of keeping the entire *TV Guide*, you just tear out the article and keep it in a file or some such place. If at some point you decide you really don't need that article, you just throw it away. The Scrapbook will retain whatever you put into it until you throw it away or cut an item out of it. Just like the Clipboard, you can throw the Scrapbook away. If you try to access it again, your system will create a new Scrapbook file to store the information.

### The ImageWriter driver

The ImageWriter driver is the part of the System Folder that allows your Macintosh to talk with an ImageWriter printer. It is similar to the switchboard at the hotel. When you pick up the telephone, someone at the switchboard answers, and you tell them who you want to call. The switchboard operator connects you to your party and you start talking. The telephone converts your voice to electronic pulses, sends them down the telephone lines and then converts them back to your voice at the other end. The ImageWriter driver converts your document into electronic pulses and sends it down the ImageWriter cable to your printer, which then decodes it and prints it out. Without the ImageWriter icon in your System Folder, you cannot communicate with an ImageWriter printer.

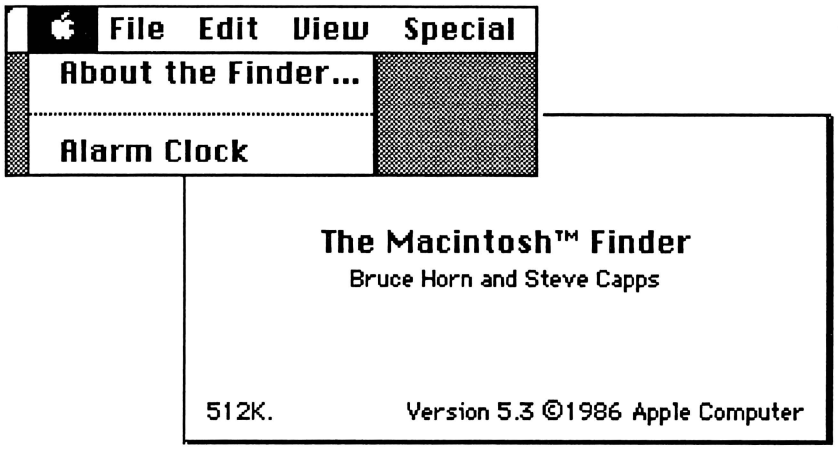
### The Font/Desk Accessory Mover

***The Font/Desk Accessory Mover helps you add or delete items from your System file.***

The Font/Desk Accessory Mover is not always found in the System Folder, but it is a useful tool. It's like a hotel loading dock. This is the program that helps you add or delete items from your System file (the storeroom), depending on what you need. If you find you need more fonts or desk accessories, just use the F/DA Mover to receive them into the storeroom. If you took inventory of your hotel storeroom and found that you had 400 phone directories from 1982, you would probably decide to save some space by throwing them away. The System file on the Macintosh works similarly. If you find there are certain fonts or desk accessories that you never use, get rid of them with the Font/DA Mover and save yourself some disk space.

### You are the hotel manager

You have been hired as the new manager of the hotel. As a manager, you may find that some of the people on your staff are not treating the guests properly. You have to make the decision either to fire them or to train and educate them so that they treat guests in a proper manner. Your storeroom is overstocked on some items and completely out of others. Your switchboard may be cutting off some phone calls. Here are some steps you might take.




*Identify which version of the Finder you have.*

### Finder version

In order to see which Finder version you're using, boot up a disk and under the Apple menu select "About the Finder..." A dialog box should appear with one of the following version numbers: 1.0, 1.1g, 4.1, 5.0, 5.1, 5.2. or 5.3. Write down that version number.

### System version

*It is not always easy to determine what version of the System you are using.*

Next we need to see what System version you're using. This is not easy to find, since the version number is hidden inside the System file. However, it's fairly safe to assume that your System version is the one normally found with your Finder version. The System and Finder versions are generally paired as follows:

| Date made available | Finder | System |
|---|---|---|
| April 1984 | 1.0 | 1.1 |
| April 1985 | 1.1g | 2.0 |
| May 1985 | 4.1 | 2.1 |
| January 1986 | 5.0 | 3.0 |
| February 1986 | 5.1 | 3.1 |
| March 1986 | 5.2 | 3.1.1 |
| June 1986 | 5.3 | 3.2 |

(Note: These dates are approximations in some cases.)

You also might be able to figure out which System version you're using by clicking once on the System file and then choosing Get Info from the File menu. Look at the date the System file was created and match it to the closest date in the list to determine your System version. This is not 100 percent accurate, but it's a start. Experienced users can find the version number by using Fedit with an ASCII search for the string "Version." There are also some public domain programs available that will tell you which version of the System file is on your disk.

## What are ROM and RAM?

*The Macintosh computer ROMS have undergone several changes.*

It is important that you know the difference between ROM and RAM in your Macintosh. ROM stands for read-only memory. It contains the instructions needed to operate your system. "Read-only" means that the information is permanently contained in the chip; it is not changed or modified by the programs you use. Currently, there are two different sets of Macintosh ROMs: the original 64K set, which came with Macintosh computers delivered through January 1986; and an expanded set of ROMs that became available in January 1986 with the Macintosh Plus and as an upgrade option for older versions. The new ROMs contain 128K of information.

The easiest way to determine which set of ROMs you have is by the disk drive you have. The 800K disk drive requires the new 128K ROMs. Therefore, if you cannot format a disk to have 800K, then you have the 64K ROMs.

RAM means random-access memory. This is where your programs and data are loaded. For example, when you open MacPaint, the program is loaded into RAM from your disk. When you quit MacPaint, the program is purged from RAM. RAM is very volatile, in that information is constantly being moved in and out as it is needed. It is the electronic work area of your computer. Only the information currently needed is in RAM. If you turn your Macintosh off, all that information is lost and will have to be reloaded the next time you turn it on.

A good metaphor for ROM would be a printed book. The information is permanent, you cannot change it. RAM is like a three-ring binder, so a Macintosh that is turned off is like an empty three-ring binder. You can add pages or take pages out as you wish, but you are limited by the size of the binder. Out of Memory messages on the Macintosh result from a situation similar to trying to put too many pages in a binder.

The various sizes of RAM available from Apple are 128K, 512K, or 1,024K (which is the same as 1Mb). The K stands for thousand. If you are using Finder versions 4.1 or higher, you can determine the amount of RAM your machine has by choosing About Finder under the Apple menu when you first insert a disk. Somewhere in the box you will see 128K, 512K, or 1,024K.

## Macintosh hardware

Now we need to know what hardware you have. Again, there are a few public domain programs that will tell you the hardware configuration you have, but if you are a beginner, your hardware configuration is more than likely to be one of the five listed on the next page:

| | Skinny Mac | Fat Mac | Enhanced | Mac Plus | Other |
|---|---|---|---|---|---|
| RAM | 128k | 512k | 512k | 1meg | 1meg+ |
| ROM | 64k | 64k | 128k | 128k | 64k or 128k |
| Disk Drive | 400k | 400k | 800k | 800k | 400 or 800k |
| External Drive | 400k | 400 or 800k | 400 or 800k* | 400 or 800k* | 400 or 800k* |
| **Recommended Finder and System Versions** | | | | | |
| Finder | 4.1 | 5.3 | 5.3 | 5.3 | 5.3 |
| System | 2.1 | 3.2 | 3.2 | 3.2 | 3.2 |

*800K recommended

(Note: Finder and System combinations higher than 4.1/2.1or 2.0 will not run on a 128K RAM Macintosh (128K RAM not ROM). Also note that Finder and System versions lower than 5.0/3.0 do not always run properly on a Macintosh with the new 128K ROMs.)

## What to do now

Now that we have the vital statistics, it's time for me to explain to you what the problem with your hotel probably is—if there *is* a problem—and a little history. As the Macintosh has progressed over the last two years, new versions of the Finder and System have been introduced to add new features, make the Macintosh more efficient, and to correct bugs in prior versions. Trying to keep up with what is currently available and what to use can be quite frustrating. To compound the problem, System 3.0 with Finder 5.0 (and later versions) can create an entirely new operating system called HFS (Hierarchical Filing System). You can still operate under the old system, called MFS ( Macintosh Filing System) with these new versions. HFS was designed to handle a large amount of data that can be stored on hard disks and the 800K disk drives.

The first thing to ask a user is "Are you happy with your current configuration? Do you have bombs or bugs frequently or never?" **IF YOU ARE HAPPY WITH YOUR CURRENT CONFIGURATION, DON'T DO ANYTHING TO CHANGE IT!** This is the old saying "if it ain't broke, don't fix it." Some people are perfectly happy with their setup. However, if you have decided to upgrade your Macintosh with the 128K ROMs and 800K disk drive, or if you have purchased the Macintosh Plus, you probably have run into some problems. Having the correct System software versions in place will solve some of these problems.

Apple has been providing these frequent upgrades for free. Each new upgrade offers additional features and benefits. Most of the software being developed now takes advantage of these new features, and if you decide you want one of these programs, you may be required to update your current Finder and System. Each disk that has a System Folder on it will need to be modified.

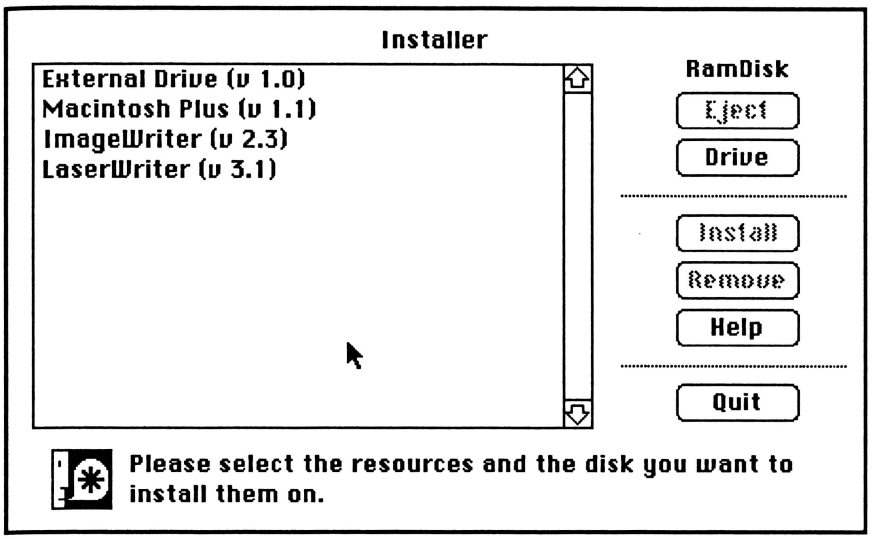
### How do I update my Finder and System to 4.1/2.1?

If you are still muddling along on a 128K RAM Macintosh and you want to update the 1.x versions of your Finder and System, Apple released a System Update program in May 1985 that will convert your System and Finder to 4.1/2.1(it will convert the older Systems and Finders, but not the 5.0/3.0 versions). Your Apple dealer may still have this update disk available, so check there first. Be sure to ask for the May 1985 update, otherwise they may give you the current 5.3/3.2 stuff, which will not work on the 128K RAM Macintosh. If the dealer does not have it, your best bet is to check with other Macintosh owners or your local Macintosh user group. Since the 128K RAM Macintosh was discontinued last year, it is more difficult to find the older system upgrades.

### How do I update my Finder and System to 5.3/3.2?

There are two methods of updating to the new versions. One is easy, but not always bulletproof, and the other is long and complicated but also recommended.

First, you need to get the 5.3/3.2 versions from your dealer or local user group. This disk should have the current version of the ImageWriter driver, as well. Also on the disk is an Installer program that will update the Finder and System to the new versions on all your disks that contain System Folders, keeping all your original desk accessories and fonts. This is the best route for the new Macintosh user, as there is little to confuse your already confused state of mind. However, this method will occasionally give you a message saying that the System creation date is not correct. If this happens, you will have to fall back on the second installation method.




Here is a brief description of each of the above items. This description in found by selecting the help button.

**Install the External Drive option if you have an unmodified Macintosh 512K and you want to use an external Apple Hard Disk 20 or 800K disk drive. Be sure to also install the Macintosh Plus update as well.**

*External Drive v1.0*

**Macintosh Plus System will update Startup disks so that they will run on both Macintosh and Macintosh Plus. The script installs or updates the following desk accessories: the Alarm Clock, the Calculator, the Chooser, the Control Panel, the Key Caps and the Scrapbook.**

*Macintosh Plus v1.1*

**ImageWriter is the printing resource that allows you to use an ImageWriter or ImageWriter II printer connected directly to your Macintosh. You also get three new or updated desk accessories: the Chooser, the new Control Panel and the Key Caps.**

*ImageWriter v2.3*

**LaserWriter is the printing resource that allows you to use the LaserWriter printer. The script installs or updates three desk accessories: the Chooser, the new Control Panel and the Key Caps. The script adds three fonts: Times 12, Helvetica 12 and Courier 10.**

*LaserWriter v3.1*

As you can see, these Installers will update your current desk accessories and fonts. This means disk space can be a critical factor. The Installer program will let you know if you're going to have enough room on your disk for the update. Try experimenting with some nonessential disks before you decide to update your important program disks. One problem with the Installer program is that it is not optimal for one-drive systems. This means you will develop disk-swap elbow (for which any doctor will tell you that the only cure is an external or hard disk).

**Option number two**

The second method of installing an updated System file and Finder is somewhat time-consuming, but may be worth the effort. This method allows you the flexibility of deciding which fonts and desk accessories to add to your System file.

*This method of updating your files takes more time but is much more flexible.*

This method involves replacing the old System and Finder with the brand-new versions. Be careful to preserve the fonts and desk accessories in your old system by using the trash canFont/DA Mover to install them in the new system.

1. If possible, make a duplicate copy of the disk you want to upgrade. Keep the original in a safe place until you have performed the upgrade and have determined that it works correctly. We will use a disk named MacWrite as an upgrade example.

2. Next, create a disk named NEW STUFF with the following three applications on it: Finder 5.3, System 3.2, and Font/DA Mover (v3.2). Turn the Macintosh off (or use the Shut Down command) and insert the disk named NEW STUFF. Your NEW STUFF disk should appear as the first icon on the right side of the screen.

3. If you have an external disk drive, insert the disk MacWrite. If you do not have an external drive, eject your NEW STUFF disk and insert MacWrite. The second icon on the right side of the screen is MacWrite.

4. Double-click on the Font/DA Mover application and open the system file on MacWrite. Copy the fonts and then the desk accessories from MacWrite to NEW STUFF. Remove any desk accessories or fonts on NEW STUFF that you do not want on your MacWrite disk. Be sure not to put so many items in the NEW STUFF System file that it is too big to fit back on your MacWrite disk. When everything is copied, quit the Font/DA mover program and return to the desktop. (Note: If you have never used the Font/DA Mover, more than likely you will not have any special fonts or desk accessories. You may want to try to get documentation on the Font/DA Mover from either your user group or from your Apple dealer. It is documented in the manual that comes with the 800K disk drive upgrade kit.)

5. Drag the System and Finder from your MacWrite disk to the trash can. Now check to see how much disk space is available.

Drag the System and Finder from NEW STUFF to the MacWrite disk. If you were careful, you won't get the message "Not Enough Room on the Disk." If you do, go back to the Font/DA Mover and delete some of the fonts and desk accessories from the NEW STUFF System.

6. Don't forget to update the ImageWriter also. If you've updated your Finder/System, then all you have to do is drag a copy of the ImageWriter from your update disk to your MacWrite disk. Again, watch that disk space. Finder copying (that is, dragging an icon from one disk to another disk) will update the ImageWriter itself from one disk to another disk) will update the ImageWriter itself, but be aware that if you have not updated the System to 3.2, you may be missing some important resources that the new ImageWriter driver uses. If you just want to update your ImageWriter to the 2.3 version but keep your present System file, then use the Installer to update.

**What about the ImageWriter?**

*There have been several upgrades to the ImageWriter driver.*

As with the Finder and System, there have been several upgrades to the ImageWriter in the past year. The current version of the ImageWriter driver (it is called a driver because it drives the printer) is v2.3. To update your disk, use the Installer program provided by Apple. This driver works with both the original ImageWriter and the newer ImageWriter II. You may want to copy your old version of the ImageWriter driver to a separate disk just for safekeeping. If problems develop with printing, just copy the old file back to your original disk. With ImageWriter versions 2.0 and above, the Print dialog box shows you the current version number, so you will be able to tell what version of the ImageWriter driver the Macintosh is using.

**Font/Desk Accessory Mover**

Again, the current version of the Font/DA Mover is version 3.2. There were several bugs in earlier versions, especially when used on a 128K Macintosh trying to move a large font. For best results, owners of 128K RAM Macintosh systems need to use F/DA Mover 3.1.

**A note about games and other software**

Many of the games currently available for the Macintosh have unique copy-protection methods or nonstandard methods of using the Finder and System file. Upgrading Finders or System files on game disks is not recommended. Check with the manufacturer or your local dealer for compatibility problems with the new ROMs. Also, if you are planning to purchase a program for your Macintosh with the 128K ROMs, you should verify that the program will work with the new ROMs.

# Upgrading System Files: A Caution for Network Users

If you are considering upgrading your System files, please be aware of the following:

After the System is upgraded, if someone on your AppleTalk network attempts to print with an earlier version of the LaserWriter driver, this message will appear:

> "The print command was not completed. The Printer needs to be re-initialized. To do so turn power off and back on again."

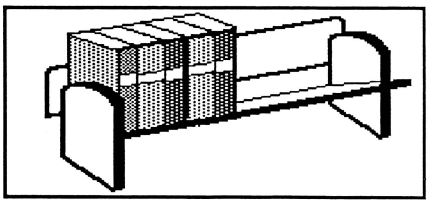
***Make sure your whole network upgrades together.***

Following these instructions will block all of the upgraded users out. To prevent this from happening, make sure that EVERYONE on the AppleTalk network is upgraded at the same time.

If, after upgrading your System file, you want to move new fonts or desk accessories into it, you must use Font D/A Mover 3.2. Earlier versions will not be able to handle some transfers.

When you upgrade, the AppleTalk connection from your earlier system will be saved in Parameter RAM and show up in the Control Panel. Most applications are shipped with ImageWriter selected in Chooser. This combination can cause problems when you first print. To prevent difficulties, make sure you go into both the Control Panel and the Chooser AFTER upgrading to check that the settings are correct.

# Resources



## Macintosh Books

Macintosh Graphics and Sound
David Kater
Osborne/McGraw-Hill
276 pages

Macintosh Midnight Madness
(Utilities & Games in BASIC)
The Waite Group
Microsoft Press
420 pages, $18.95

### BASIC

Microsoft BASIC Programming for the Mac
Sharon Zardetto Aker
Scott, Foresman and Company
344 pages, $17.95

Short, Simple, and BASIC: Business Programs for the Macintosh
M. Robinson and T. Kepner
Scott, Foresman and Company
320 pages, $18.95

### Data Base

Microsoft File
Nancy Andrews
Microsoft Press
451 pages
$18.95

### General Macintosh

Personal Financial Planning with The Home Accountant
Steve Adams
Arrays, Inc.
818-901-8828, 800-468-9222
248 pages, 17.95

The Apple Macintosh Book
(2nd Edition)
Cary Lu
422 pages, $19.95

Mac at Work
S. Venit and D. Burns
Wiley Press, NY
228 pages, $17.95

MacGuide: The Complete Handbook for Macintosh
Leslie Smith
New American Library
277 pages, $14.95

Mac Power
Allen Munro
Scott, Foresman and Company
320 pages, $15.95

# Macintosh Books

## Graphics, Art, Word Processing

The MAC Art Department
Tom Christopher
Simon & Schuster, NY
96 pages, disk, $39.95

The Printed WORD
David Kater & Richard Kater
Microsoft Press
Bellevue, WA
293 pages, $17.95
(Review: MACAZINE, Vol.3, No.2, p. 36)

MacGraphics for Business
Jerry Mar
Scott, Foresman and Company
194 pages, $17.95

Graphics for the Macintosh: An Idea Book
J. Grillo and D. Robertson
CBS Computer Books
Holt, Rinehart, and Winston
217 pages, $17.95

MacCats: 99 Ways to Paint a Cat with MacPaint
Floyd Flanagan
Scott, Foresman and Company
146 pages, $9.95

## Miscellaneous

PostScript Language Reference Manual
Adobe Systems Incorporated
Addison-Wesley Publishing Company
319 pages, $22.95

AI Programming on the Macintosh
Dan Shafer
SAMS (A Division of Macmillan, Inc.)
290 pages, $24.95

PostScript Language Tutorial and Cookbook
Adobe Systems Incorporated
Addison-Wesley Publishing Company
243 pages, $16.95

## Pascal

The Magic of Macintosh Graphics & Sound in Pascal
Bill Twitty
Scott, Foresman and Company
416 pages, $19.95

Learning Macintosh Pascal: A Guide for Programmers
J. Wikert & S. Davis
Scott, Foresman and Company
356 pages, $19.95

Scientific Programming with Macintosh Pascal
Crandall and Colgrove
Wiley Press
279 pages, $18.95

The Magic of Macintosh: Programming Graphics and Sound
William Twitty
Scott, Foresman and Company
314 pages, $19.95

# Macintosh Books

## Programming

Assembly Language Primer for Macintosh
Keith Mathews
The Waite Group
412 pages, $24.95

Mastering the Macintosh Toolbox
D. Peabody
McGraw-Hill Book Company
200 pages

Using the Macintosh Toolbox with C
Takasuka, Huxham, and Burnard
Sybex Books
559 pages

Programming in C on the Macintosh
Terry A. Ward
Scott, Foresman and Company
411 pages, $21.95

Programming the Macintosh: An Advanced Guide
William Twitty
Scott, Foresman and Company
374 pages, $19.95

## Spreadsheets

Multiplan Mastery on the Macintosh
Andrew J. Townsend
Scott, Foresman and Company
260 pages, $18.95

Doug Clapp's JAZZ Book
Doug Clapp
Scott, Foresman and Company
272 pages, $17.95

Hands-on EXCEL
Danny Goodman
Scott, Foresman and Company
328 pages, $21.95

Making Your Macintosh EXCEL
Bill O'Brien
Scott, Foresman and Company
356 pages, $19.95

# Articles of Interest—Business

## Accounting

| | | | |
|---|---|---|---|
| Front Desk | A+ MAGAZINE | June 85 | p. 107 |
| Front Desk | MACAZINE | June 85 | p. 79 |
| Front Desk | POP. COMP. | Sept. 85 | p. 107 |
| Accounting: Plain and Simple | INFOWORLD | June 30, 86 | p. 37 |
| Accounting Software for Mac | MACUSER | Dec. 85 | p. 52 |
| Accountant's Choice | MACUSER | Dec. 85 | p. 56 |
| Back to Basics in Accounting | A+ MAGAZINE | Apr. 85 | p. 65 |
| Back to Basics Accounting | MACWORLD | Dec. 85 | p. 75 |
| BPI General Accounting | MACUSER | Aug. 86 | p. 33 |
| Check Mark General Ledger | MACUSER | Dec. 85 | p. 56 |

## Articles of Interest—Business

| | | | |
|---|---|---|---|
| Dollars & $ense | MACAZINE | Vol. 3 No.1 | p. 18 |
| Dollars & $ense | A+ MAGAZINE | June 85 | p. 37 |
| Dollars & $ense | MACWORLD | June 85 | p. 106 |
| | | | |
| Designing Forms | MACWORLD | June 86 | p. 89 |
| The Home Accountant | MACAZINE | May 86 | p. 85 |
| Maccountant | MACUSER | Dec. 85 | p. 58 |
| | | | |
| Mac OneWrite | INFOWORLD | Oct. 14, 85 | p. 45 |
| Mac OneWrite | MACUSER | Dec. 85 | p. 58 |
| Mac OneWrite | MACWORLD | Mar. 86 | p. 123 |
| | | | |
| Macs on the Audit Trail | MACWORLD | Feb. 85 | p. 150 |
| MacProject | MACAZINE | June 86 | p. 37 |
| Micro Planner | MACAZINE | June 86 | p. 37 |
| Palantir—Accounting | MACUSER | Dec. 85 | p. 114 |
| Palantir Financial Series | MACAZINE | Vol.3 No.1 | p. 13 |
| Profit Stalker II | MACUSER | Aug. 86 | p. 34 |
| Project Management | MACAZINE | June 86 | p. 37 |
| Rags to Riches | MACUSER | July 86 | p. 34 |
| Rags to Riches—Accounting | MACUSER | Dec. 85 | p. 114 |
| Rags to Riches | MACAZINE | Vol.3 No.1 | p. 14 |
| Strictly Business—Accounting | MACUSER | Dec. 85 | p. 114 |

## Taxes

| | | | |
|---|---|---|---|
| MacInTax | MACUSER | Jan. 86 | p. 46 |
| MacInTax | MACWORLD | Mar. 86 | p. 88 |
| MacInTax | MACAZINE | Vol.3 No.1 | p. 64 |
| | | | |
| Mac Tax Packages | MACAZINE | Vol.3 No.3 | p. 25 |
| | | | |
| Tax Wizard | MACUSER | Jan. 86 | p. 48 |
| Tax Wizard | MACAZINE | Vol.3 No.1 | p. 64 |
| Tax Wizard | MACWORLD | Mar. 86 | p. 89 |
| | | | |
| Tax Prep | MACUSER | Jan. 86 | p. 48 |
| Tax Prep | MACWORLD | Mar. 86 | p. 90 |
| The Tax Man Cometh (several packages) | MACWORLD | Mar. 85 | p. 106 |
| Tax Plan | MACWORLD | Mar. 86 | p. 90 |
| Tax Master | MACWORLD | Mar. 86 | p. 91 |

## Miscellaneous Business

| | | | |
|---|---|---|---|
| MegaForm | MACWORLD | Jul. 85 | p. 86 |
| Mac Goes Pro Forma (MegaForm) | MACWORLD | Jul. 85 | p. 84 |
| MegaForm | MACUSER | Feb. 86 | p. 69 |
| | | | |
| MindSight | NIBBLE | Nov. 85 | p. 78 |
| MindSight | INFOWORLD | Oct. 28, 85 | p. 42 |
| MindSight | MACWORLD | Apr. 86 | p. 96 |

## Articles of Interest—Business

| | | | |
|---|---|---|---|
| MindSight | A+ MAGAZINE | Apr. 86 | p. 120 |
| ODS Consultant | MACUSER | Apr. 86 | p. 55 |
| PageMaker | ICON REVIEW | Summer 85 | p. 15 |
| PageMaker | MACWORLD | July 85 | p. 76 |
| PageMaker | MACUSER | Nov. 85 | p. 51 |
| MacPublisher | A+ MAGAZINE | June 85 | p. 119 |
| MacPublisher | ICON REVIEW | Summer 85 | p. 15 |
| MacPublisher | MACWORLD | July 85 | p. 72 |
| MacPublisher | MACAZINE | Mar. 85 | p. 151 |
| AppleTalk Network | A+ MAGAZINE | Mar. 85 | p. 35 |
| AppleTalk Developers | INFOWORLD | Mar. 11, 85 | p. 20 |
| BIZMAC | ICON REVIEW | Summer 85 | p. 13 |
| Business Essentials | MACWORLD | Nov. 85 | p. 95 |
| Chequebook | MACWORLD | Nov. 85 | p. 136 |
| Chequebook | A+ MAGAZINE | June 85 | p. 133 |
| Consultant | MACAZINE | June 85 | p. 81 |
| Consultant | ICON REVIEW | Summer 85 | p. 11 |
| Consultant | A+ MAGAZINE | Apr. 86 | p. 126 |
| Corporate Computing | A+ MAGAZINE | Apr. 85 | p. 78 |
| Decision Map | INFOWORLD | Oct. 14, 85 | p. 43 |
| Decision Map | A+ MAGAZINE | Apr. 86 | p. 124 |
| Decision Map | MACWORLD | Apr. 86 | p. 102 |
| Electric Checkbook | A+ MAGAZINE | June 85 | p. 134 |
| Electric Checkbook | ICON REVIEW | Summer 85 | p. 16 |
| Financial Cookbook | MACWORLD | Apr. 86 | p. 132 |
| Gallery Finance | MACUSER | Dec. 85 | p. 54 |
| Habadex | COMP. & ELEC. | Mar. 85 | p. 38 |
| HABA Check Minder | MACWORLD | Nov. 85 | p. 144 |
| LaserFonts | MACWORLD | Feb. 85 | p. 45 |
| The LaserWriter | MACWORLD | Feb. 85 | p. 70 |
| The Mac Office | A+ MAGAZINE | Mar. 85 | p. 26 |
| MacProject (Review) | INFOWORLD | Mar. 11, 85 | p. 37 |
| MacProject | MACAZINE | Vol. 2 No.12 | p. 51 |
| MacProject | MACUSER | Mar. 86 | p. 54 |
| Mail Center | MACWORLD | Dec. 85 | p. 82 |
| Mail Manager | ICON REVIEW | Summer 85 | p. 14 |

## Desktop Publishing

## Business Related

## Articles of Interest—Business

| | | | |
|---|---|---|---|
| Mail Manager | MACWORLD | Apr. 86 | p.125 |
| MegaMerge | INFOWORLD | Apr. 8, 85 | p. 50 |
| Micro Planner | MACAZINE | Vol. 2 No.12 | p. 51 |
| Micro Planner | MACUSER | Mar. 86 | p. 54 |
| Profit Projections/Break even | A+ MAGAZINE | Mar. 86 | p. 135 |
| Profit Projection | ICON REVIEW | Summer 85 | p. 13 |
| ReadySetGo | A+ MAGAZINE | June 85 | p. 124 |
| Stocks and Bonds | MACUSER | May 86 | p. 75 |
| Straight Talk (Dow Jones) | MACWORLD | June 85 | p. 86 |
| WillWriter | MACUSER | Jan. 86 | p. 34 |
| WillWriter | MACWORLD | Apr. 86 | p. 140 |
| WillWriter | MACAZINE | June 86 | p. 33 |

# Articles of Interest—Computer Languages

## Programs in BASIC

| | | | |
|---|---|---|---|
| Microsoft BASIC | A+ MAGAZINE | June 85 | p. 123 |
| Microsoft BASIC 2.0 | BYTE | Jan. 85 | p. 155 |
| Microsoft BASIC 2.1 | A+ MAGAZINE | July 85 | p. 119 |
| BASIC | MACUSER | Jan. 86 | p. 110 |
| Applesoft to Microsoft | NIBBLE | Sep. 85 | p. 52 |
| Autolog - TeleCom | NIBBLE | Nov./Dec. 85 | p. 44 |
| BASIC: A Look at ROM | MACUSER | Jan. 86 | p. 105 |
| BASIC Multiplan Connection | NIBBLE | May/June 86 | p. 46 |
| BASIC: using CLR Libraries | MACUSER | July 86 | p. 93 |
| Change Fonts and Sizes | NIBBLE | Mar./Apr 86 | p. 52 |
| Cursor Editor | NIBBLE | May/June 86 | p. 26 |
| Fractal Trees | NIBBLE | Jan./Feb. 86 | p. 48 |
| Locating Mouse Coordinates | MACWORLD | Nov. 85 | p. 170 |
| I Ching (game) | NIBBLE | Mar./Apr. 86 | p. 27 |
| Macbanker (checking account) | NIBBLE | Jan./Feb. 86 | p. 9 |
| MacBanner (sign maker) | NIBBLE | Mar./Apr. 86 | p. 18 |
| Mac File Cabinet | NIBBLE | Nov. 85 | p. 9 |
| MacGraph Program | NIBBLE | Sept. 85 | p. 34 |
| Mac Investor Program | NIBBLE | Sept. 85 | p. 6 |

## Articles of Interest—Computer Languages

| | | | |
|---|---|---|---|
| Mac Investor revisited | NIBBLE | Mar./Apr. 86 | p. 66 |
| MacNosy | A+ MAGAZINE | June 85 | p. 145 |
| MacSprint (speed reading) | NIBBLE | May/June 86 | p. 9 |
| Microsoft BASIC Tricks | NIBBLE | Nov./Dec. 85 | p. 42 |
| Microsoft BASIC Tricks | NIBBLE | Jan./Feb.86 | p. 37 |
| MS BASIC Program Shell | NIBBLE | May/June 86 | p. 52 |
| MS BASIC Toolbox Windows | NIBBLE | Nov. 85 | p. 68 |
| MS BASIC Windows | NIBBLE | Nov./Dec.85 | p. 69 |
| Neon | A+ MAGAZINE | March 86 | p. 128 |
| NIBBLE MacFile Cabinet | NIBBLE | Nov./Dec.85 | p. 9 |
| Pattern Designer Program | NIBBLE | Sept. 85 | p. 26 |
| Pattern Design Program in BASIC | MACWORLD | Jan. 86 | p. 156 |
| Picture Aide (puts pics in programs) | A+ MAGAZINE | Apr. 86 | p. 137 |
| Rescuing a Document | MACWORLD | Nov. 85 | p. 163 |
| Stop Watch Program | NIBBLE | Nov./Dec.85 | p. 74 |
| Zoom (Data base of Pictures) | NIBBLE | Mar./Apr. 86 | p. 9 |

## Pascal

| | | | |
|---|---|---|---|
| Macintosh Pascal Primer Part I | A+ MAGAZINE | Mar. 85 | p. 95 |
| Macintosh Pascal Primer Part II | A+ MAGAZINE | Apr. 85 | p. 95 |
| Macintosh Pascal | MACWORLD | Apr. 85 | p. 123 |
| Macintoash Pascal | MACAZINE | Vol.3 No.3 | p. 76 |
| Macintosh Pascal Shell Program | NIBBLE | Nov. 85 | p. 65 |
| Pascal | MACUSER | Jan. 86 | p. 114 |
| Pascal and the Mac Interface | MACUSER | Aug. 86 | p. 105 |
| A Taste of Pascal | MACUSER | July 86 | p. 104 |
| TML Pascal | MACUSER | June 86 | p. 98 |

## Miscellaneous Articles on Computer Languages

| | | | |
|---|---|---|---|
| Aztec C | MACUSER | May 86 | p. 36 |
| To C or Not To C | A+ MAGAZINE | Apr. 85 | p. 87 |
| C-Worthy Compiler (Consulair) | A+ MAGAZINE | May 85 | p. 143 |
| C | MACUSER | Jan. 86 | p. 112 |
| C Program (Macintosh Sound) | MACUSER | Apr. 86 | p. 105 |
| C Programming | MACUSER | March 86 | p. 104 |
| C Programming | MACUSER | May 86 | p. 105 |
| C Programming | MACUSER | June 86 | p. 108 |
| Assembly-Language Programs | A+ MAGAZINE | Mar. 85 | p. 103 |
| Assembly-Language Programming | A+ MAGAZINE | Feb. 85 | p. 109 |
| Assembly-Language Programming | A+ MAGAZINE | Feb. 85 | p. 99 |
| 68000 Assembly Language III | A+ MAGAZINE | Aug. 86 | p. 91 |
| ExperLogo | INFOWORLD | June 86 | p. 52 |

## Articles of Interest—Computer Languages

| | | | |
|---|---|---|---|
| Forth | MACUSER | Jan. 86 | p. 115 |
| The Macintosh Lisp Machine | MACWORLD | Mar. 86 | p. 99 |
| MacScheme | MACUSER | June 86 | p. 36 |
| FORTRAN | MACWORLD | June 86 | p. 110 |
| MacForth Level II | MACUSER | July 86 | p. 36 |
| MACFORTRAN | MACAZINE | June 85 | p. 51 |
| Macintosh Languages | A+ MAGAZINE | July 85 | p. 135 |
| Microsoft Basic Tricks | NIBBLE | Mar./Apr. 86 | p. 44 |
| The PostScript Language | MACWORLD | Feb. 85 | p. 106 |
| PostScript Graphics | A+ MAGAZINE | Mar. 85 | p. 30 |

# Articles of Interest—Data Bases

### Microsoft File

| | | | |
|---|---|---|---|
| Microsoft File | MACWORLD | May 85 | p. 96 |
| Microsoft File | INFOWORLD | Apr. 29, 85 | p. 85 |
| Microsoft File | A+ MAGAZINE | June 85 | p. 107 |
| Microsoft File | ICON REVIEW | Summer 85 | p. 9 |
| Microsoft File | NIBBLE | Sep. 85 | p. 70 |

### Filevision

| | | | |
|---|---|---|---|
| Filevision (Telos) | MACWORLD | Jan. 85 | p. 62 |
| Filevision (Telos) | POP. COMP. | Mar. 85 | p. 60 |
| Filevision | A+ MAGAZINE | June 85 | p. 107 |
| Teaching with Filevision | A+ MAGAZINE | Dec. 85 | p. 109 |
| Business Filevision | MACAZINE | Vol.3 No.2 | p. 83 |
| Business Filevision | MACUSER | Feb. 86 | p. 46 |
| Business Filevision | A+ MAGAZINE | Feb. 86 | p. 135 |
| Filevision gets down to business | MACWORLD | Mar. 86 | p. 94 |
| Interlace | MACUSER | Apr. 86 | p. 47 |
| Interlace | MACAZINE | May 86 | p. 69 |

### FactFinder

| | | | |
|---|---|---|---|
| FactFinder | MACWORLD | Feb. 85 | p. 84 |
| FactFinder | INFOWORLD | Mar. 18, 85 | p. 43 |
| FactFinder | POP. COMP. | Aug. 85 | p. 111 |
| FactFinder | ICON REVIEW | Summer 85 | p. 6 |
| Mainstreet Filer | MACWORLD | Jan. 85 | p. 86 |
| Mainstreet Filer | A+ MAGAZINE | June 85 | p. 107 |
| Flexware | MACAZINE | May 86 | p. 69 |
| MacBase | MACUSER | July 86 | p. 32 |
| PictureBase | MACWORLD | July 86 | p. 152 |

## Articles of Interest—Data bases

| | | | |
|---|---|---|---|
| Record Holder | MACAZINE | May 86 | p. 69 |
| 1stBASE (DeskTop Software) | MACWORLD | Jan. 85 | p. 7 |
| 1stBASE | A+ MAGAZINE | June 85 | p. 122 |
| PFS: File | MACWORLD | Jan. 85 | p. 81 |
| PFS: File | A+ MAGAZINE | June 85 | p. 107 |
| OverVUE | A+ MAGAZINE | Feb. 85 | p. 89 |
| OverVUE | A+ MAGAZINE | June 85 | p. 107 |
| OverVUE | INFOWORLD | Apr. 1, 85 | p. 44 |
| OverVUE | INFOWORLD | July 8, 85 | p. 41 |
| OverVUE | ICON REVIEW | Summer 85 | p. 7 |
| OverVUE | MACUSER | Nov. 85 | p. 59 |
| OverVUE | NIBBLE | Sep. 85 | p. 70 |
| Helix | INFOWORLD | Apr. 29, 85 | p. 77 |
| Helix | A+ MAGAZINE | June 85 | p. 107 |
| Helix | ICON REVIEW | Summer 85 | p. 5 |
| Helix | MACWORLD | Nov. 85 | p. 89 |
| Helix | NIBBLE | Sept. 85 | p. 70 |
| Helix | POP. COMP. | Sept. 85 | p. 93 |
| Helix 2.0 | MACUSER | Mar. 86 | p. 48 |
| Helix V2.0RII | MACWORLD | June 86 | p. 120 |
| Omnis 3 | A+ MAGAZINE | June 85 | p. 107 |
| Omnis 3 | INFOWORLD | July 15, 85 | p. 18 |
| Omnis 3 | MACUSER | Nov. 85 | p. 36 |
| Omnis 3 | NIBBLE | Sept. 85 | p. 70 |
| Omnis 3 | POP. COMP. | Dec. 85 | p. 70 |
| Omnis 3 | MACUSER | Mar. 86 | p. 42 |
| MegaFiler | A+ MAGAZINE | June 85 | p. 107 |
| MegaFiler | INFOWORLD | Apr. 8, 85 | p. 50 |
| DB Master | MACWORLD | Jan. 85 | p. 85 |
| DB Master | A+ MAGAZINE | June 85 | p. 107 |
| DB Master for the Mac | POP. COMP. | July 85 | p. 110 |
| MacLion | INFOWORLD | May 27, 85 | p. 47 |
| MacLion | A+ MAGAZINE | June 85 | p. 107 |
| MacLion | NIBBLE | Sept. 85 | p. 70 |
| MacLion | POP. COMP. | Sept. 85 | p. 93 |

### OverVUE

### Helix

### Omnis

### MacLion

# Articles of Interest—Desk Accessories

| | | | |
|---|---|---|---|
| Expanding the Apple Menu | NIBBLE | Mar./Apr. 86 | p. 40 |
| Choosing a Database | MACWORLD | Aug. 86 | p. 146 |
| Mockchart | NIBBLE | Mar./Apr. 86 | p. 42 |
| SideKick | MACUSER | Dec. 85 | p. 46 |
| SideKick- DA | MACWORLD | Mar. 86 | p. 107 |
| SideKick | MACUSER | Dec. 85 | p. 112 |
| SideKick | NIBBLE | Mar./Apr. 86 | p. 40 |
| Teleport | NIBBLE | Mar./Apr. 86 | p. 42 |
| Quick and Dirty Utilities | NIBBLE | Mar./Apr. 86 | p. 43 |

# Articles of Interest—Education

| | | | |
|---|---|---|---|
| Consortium Software | A+ MAGAZINE | May 86 | p. 40 |
| Dapona Gradebook | MACAZINE | May 86 | p. 30 |
| MacType | MACAZINE | Vol.3 No.3 | p. 43 |
| Math Flash | MACAZINE | Vol.3 No.3 | p. 45 |
| NotePRO | MACUSER | July 86 | p. 36 |
| NotePRO | MACAZINE | May 86 | p. 88 |
| SAT Score Improvement | MACUSER | May 86 | p. 40 |
| Slide Show Magician &Videoworks | MACUSER | May 86 | p. 83 |
| Spanish Grammar III | MACUSER | Apr. 86 | p. 33 |
| Speed Reader II | MACUSER | Apr. 86 | p. 36 |
| Speed Reader II | ICON REVIEW | Summer 85 | p. 22 |
| Speller Bee | MACWORLD | Apr. 86 | p. 148 |
| SpellerBee | MACAZINE | May 86 | p. 90 |
| The University Macintosh | A+ MAGAZINE | June 86 | p. 111 |
| Word Play | MACAZINE | Vol. 3 No.3 | p. 43 |

# Articles of Interest—Games

| | | | |
|---|---|---|---|
| Airborne | MACAZINE | June 85 | p. 47 |
| Amazon | MACUSER | Feb. 86 | p. 36 |
| The Ancient Art of War | MACWORLD | Aug. 86 | p. 129 |
| Bagels 1.1 | MACWORLD | Aug. 86 | p. 103 |
| Balance of Power | MACWORLD | July 86 | p. 146 |

## Articles of Interest—Games

| | | | |
|---|---|---|---|
| Billiard Parlour | MACWORLD | Aug. 1986 | p. 103 |
| Borrowed Time | MACUSER | May 86 | p. 97 |
| Brimstone | MACUSER | July 1986 | p. 34 |
| Championship Boxing | MACUSER | Mar. 86 | p. 87 |
| Championship Star League Baseball | MACWORLD | Mar. 86 | p. 140 |
| The Crimson Crown | MACUSER | Aug. 1986 | p. 87 |
| Deadline | MACUSER | Dec. 85 | p. 98 |
| Deja Vu | MACUSER | Jan. 86 | p .89 |
| Deja Vu | MACAZINE | Vol.3 No.2 | p. 38 |
| Enchanted Scepters | MACUSER | May 86 | p. 37 |
| Enchanted Scepters | MACWORLD | June 86 | p. 145 |
| Enchanter | MACAZINE | Apr. 85 | p. 45 |
| Entertainment Software | MACAZINE | Vol.3 No.3 | p. 47 |
| Flight Simulator | MACWORLD | Aug. 86 | p. 129 |
| Flight Simulator | A+ MAGAZINE | Aug. 86 | p. 72 |
| Fokker Triplane | MACUSER | Feb. 86 | p. 93 |
| Forbidden Quest | MACWORLD | May 85 | p. 76 |
| Felony | MACUSER | Dec. 85 | p. 98 |
| Gateway | MACWORLD | Nov. 85 | p. 133 |
| Gato | MACUSER | Nov. 85 | p. 38 |
| Gato | MACWORLD | Dec. 85 | p. 125 |
| Grid Wars | MACUSER | Apr. 86 | p. 33 |
| Grid Wars | MACAZINE | Vol. 2 No.12 | p. 35 |
| Harrier Strike Mission | MACUSER | Feb. 86 | p. 93 |
| Harrier Strike Mission | MACUSER | Jan. 86 | p. 34 |
| Hitchhikers Guide to the Galaxy | MACWORLD | May 85 | p. 76 |
| Infidel | MACUSER | Feb. 86 | p. 32 |
| Load Runner | MACAZINE | Apr. 85 | p. 45 |
| MacChallenger | MACUSER | Feb. 86 | p. 93 |
| MacGolf | MACWORLD | Aug. 86 | p. 144 |
| MacGolf | MACAZINE | May 86 | p. 63 |
| MacGolf | MACUSER | May 86 | p. 94 |
| MacMatch | A+ MAGAZINE | Nov. 85 | p. 171 |
| Masterpieces (Puzzle) | A+ MAGAZINE | Nov. 85 | p. 169 |
| Millionaire | MACAZINE | Apr. 85 | p. 45 |
| Mind Over Mac | MACUSER | Feb. 86 | p. 32 |

## Articles of Interest—Games

| | | | |
|---|---|---|---|
| MindShadow | MACWORLD | June 86 | p. 160 |
| The Mist | MACUSER | June 86 | p. 97 |
| Murder By the Dozen | MACUSER | Dec. 85 | p. 98 |
| Orbiter | MACUSER | July 86 | p. 34 |
| Pinball Construction Set | MACUSER | Jan. 86 | p. 36 |
| Psion Chess | A+ MAGAZINE | Dec. 85 | p. 179 |
| Psion Chess | MACAZINE | Vol.3 No.3 | p. 22 |
| Ractor | MACWORLD | June 86 | p. 148 |
| Rogue | MACUSER | Feb. 86 | p. 86 |
| Sargon III | MACWORLD | Apr. 85 | p. 84 |
| Sargon III | ICON REVIEW | Summer 85 | p. 19 |
| Sargon III vs. Psion | MACUSER | Mar. 86 | p. 81 |
| Sorcerer | MACAZINE | Apr. 85 | p. 45 |
| Strategic Conquest | MACUSER | Dec. 85 | p. 34 |
| Suspect | MACUSER | Dec. 85 | p. 98 |
| Through the Looking Glass | MACWORLD | Mar. 85 | p. 85 |
| Through the Looking Glass | MACUSER | Jan. 86 | p. 33 |
| Transylvania | MACWORLD | May 85 | p. 79 |
| Transylvania | MACUSER | Aug. 86 | p. 87 |
| Tycoon | NIBBLE | Jan./Feb. 86 | p. 46 |
| Ultima III | MACAZINE | Vol.2 No.12 | p. 92 |
| Universe II | MACUSER | Jan. 86 | p. 95 |
| The Witness | MACUSER | Dec. 85 | p. 98 |
| Wizardry | MACWORLD | Apr. 86 | p.138 |
| Wizardry | MACUSER | June 86 | p. 94 |
| Wizardry | MACAZINE | May 86 | p. 62 |
| Zork | MACUSER | Dec. 85 | p. 97 |

## Articles of Interest—Graphic Design

| | | | |
|---|---|---|---|
| Cheap Paint | MACAZINE | Vol.3 No.3 | p. 22 |
| ClickArt Effects | MACUSER | Apr. 86 | p. 35 |
| ColorMate | MACWORLD | July 86 | p. 117 |

## Articles of Interest—Graphics

| | | | |
|---|---|---|---|
| ColorPrint | MACWORLD | July 86 | p. 95 |
| Comic Works | MACWORLD | Aug. 86 | p. 59 |
| Cricket Graph | MACWORLD | July 86 | p. 95 |
| Cricket Graph | MACUSER | June 86 | p. 37 |
| Easy3D | MACUSER | May 86 | p. 69 |
| Full Paint | MACUSER | June 86 | p. 36 |
| Home Design | MACUSER | June 86 | p. 38 |
| Icon Collector V 1.1 | MACAZINE | July 86 | p. 43 |
| Mac-A-Mug | MACUSER | July 86 | p. 75 |
| Mac The Ripper | MACUSER | May 86 | p. 40 |
| MacDraft | MACUSER | Feb. 86 | p. 81 |
| MacDraft | MACUSER | Dec. 85 | p. 36 |
| MacDraft | MACAZINE | Vol.3 No.1 | p. 76 |
| MacDraft | MACWORLD | Jan. 86 | p. 92 |
| MacDraft vs. MacDraw | MACAZINE | Vol. 3 No. 1 | p. 97 |
| MacModel | MACWORLD | June 6 | p. 99 |
| MacSpace | MACWORLD | June 86 | p. 98 |
| MacSpin | MACWORLD | Aug. 86 | p. 97 |
| Mac 3D | MACWORLD | June 86 | p. 96 |
| Mac Viz | MACAZINE | May 86 | p. 81 |
| Microsoft Chart | INFOWORLD | Jan. 14, 85 | p. 56 |
| Microsoft Chart | MACWORLD | May 85 | p. 40 |
| Presentation Graphics on the Macintosh by Lambert (Microsoft) | | | |
| MacPaint V 1.0 | MACAZINE | July 86 | p. 42 |
| Paste-Ease V1 | MACAZINE | Vol.3 No.3 | p. 19 |
| PictureBase | MACUSER | June 86 | p. 38 |
| PictureBase | MACAZINE | July 86 | p. 54 |
| "Picture Perfect Presentation" | MACUSER | July 86 | p. 60 |
| PosterMaker | MACAZINE | July 86 | p. 40 |
| Silicon Press | MACUSER | Aug. 86 | p. 75 |
| Slide Show Magician | MACWORLD | Aug. 86 | p. 132 |
| Slide Show Magician | ICON REVIEW | Summer 85 | p. 12 |
| Slide Show Magician | A+ MAGAZINE | Jan. 86 | p. 94 |
| VideoWorks | MACWORLD | Aug. 86 | p. 108 |
| VideoWorks | A+ MAGAZINE | Aug. 85 | p. 68 |

## Miscellaneous Articles on Graphics

| | | | |
|---|---|---|---|
| Animation Toolkit I | MACWORLD | Jun. 85 | p. 97 |
| Color Macintosh | MACUSER | May 86 | p. 61 |
| Cutting, Pasting, Using Graphics | MACWORLD | Jan. 86 | p. 68 |
| Graphing in 3D | MACAZINE | Vol.3 No.3 | p. 78 |

## Articles of Interest—Graphics

| | | | |
|---|---|---|---|
| ThunderScan | MACAZINE | Vol.3 No.3 | p. 15 |
| MacDraw | MACWORLD | Jul. 85 | p. 121 |
| MacDraw | MACUSER | Nov. 85 | p. 74 |
| MacIntizer | MACUSER | Jan. 86 | p. 86 |
| MacPaint | A+ MAGAZINE | Aug. 85 | p. 143 |
| Macromind Utilities | MACUSER | Feb. 86 | p. 36 |
| MacTablet | MACUSER | Jan. 86 | p. 84 |
| MacTracks | ICON REVIEW | Summer 85 | p. 26 |
| Magic Slate | MACUSER | Feb. 86 | p. 32 |
| Paint | MACAZINE | Vol.3 No.1 | p. 43 |
| Working with Clipboard, Scrapbook, Notepad | MACUSER | Mar. 86 | p.91 |

# Articles of Interest—Hardware

## Hard Disks

| | | | |
|---|---|---|---|
| Hard Disk Decisions | MACWORLD | June 86 | p. 103 |
| Making the Most of an HD | MACUSER | July 86 | p. 44 |
| HyperDrive Hard Disk | A+ MAGAZINE | Mar. 85 | p. 15 |
| HD20 and the HyperDrive 20 | A+ MAGAZINE | Feb. 86 | p. 125 |
| HyperDrive | MACUSER | Feb. 86 | p. 63 |
| Hard Disk Drives for Mac | POP. COMP. | Apr. 85 | p. 100 |
| Hard Disk Drives for Mac | ICON REVIEW | Mar. 85 | p. 28 |
| Mac 10 (hard disk) | MACAZINE | Vol.3 No.1 | p. 65 |
| Hard Disk 20 | MACWORLD | Jan. 86 | p. 77 |
| MacBottom | MACAZINE | Vol.3 No.1 | p. 24 |
| Optical Disks | MACWORLD | Feb. 86 | p. 100 |
| Bernoulli Box | INFOWORLD | July 29, 85 | p. 47 |
| MacEnhancer | A+ MAGAZINE | Mar. 85 | p. 82 |
| MacEnhancer | INFOWORLD | July 29, 85 | p. 52 |
| MacEnhancer | MACWORLD | Nov. 85 | p. 154 |
| MacCharlie | POP. COMP. | Dec. 85 | p. 65 |
| MacCharlie | MACUSER | Dec. 85 | p. 60 |
| MacCharlie | MACWORLD | Feb. 86 | p. 120 |
| MacCharlie (file transfer) | A+ MAGAZINE | Jan. 86 | p. 129 |

## Articles of Interest—Hardware

| | | | |
|---|---|---|---|
| Megabyte Mac | INFOWORLD | Aug. 12, 85 | p. 47 |
| MacVision | MACWORLD | Apr. 85 | p. 71 |
| MacIntizer | MACUSER | Jan. 86 | p. 86 |

## Miscellaneous Articles on Hardware

| | | | |
|---|---|---|---|
| Abaton (file transfer) | A+ MAGAZINE | Jan. 86 | p. 129 |
| Choosing Apple Hardware | MACUSER | May 86 | p. 42 |
| Granny Smith Connection | MACAZINE | Vol.2 No.12 | p. 80 |
| ImageWriter II | MACWORLD | Jan. 86 | p. 86 |
| LaserWriter Revealed | MACUSER | Feb. 86 | p. 55 |
| Macintosh Plus | MACWORLD | Feb. 86 | p. 57 |
| Macintosh Plus | A+ MAGAZINE | Mar. 86 | p. 22 |
| Macintosh Plus | MACUSER | Mar. 86 | p. 39 |
| Making the Hardware Connection | A+ MAGAZINE | Jan. 86 | p. 30 |
| MacTablet | MACUSER | Jan. 86 | p. 83 |
| Mac Turbo Touch | A+ MAGAZINE | Apr. 85 | p. 72 |
| Memory Upgrades | MACWORLD | Feb. 86 | p. 114 |
| 5 Memory Upgrades | MACWORLD | Feb. 86 | p. 115 |
| Networking Hardware and Software | MACAZINE | Vol.3 No.3 | p. 87 |
| Penmouse + | MACWORLD | Aug. 86 | p. 146 |
| Printing in Color | MACWORLD | Feb. 86 | p. 114 |
| ProModem 1200 | MACWORLD | Apr. 86 | p. 129 |
| RAMSTAK (memory for the XL) | MACAZINE | Vol.3 No.3 | p. 42 |
| Software Strip Reader | MACUSER | Apr. 86 | p. 38 |
| ThunderScan | MACAZINE | Apr. 85 | p. 10 |
| ThunderScan | MACWORLD | Apr. 85 | p. 76 |
| ThunderScan | A+ MAGAZINE | Aug. 85 | p. 136 |

# Articles of Interest—Miscellaneous

| | | | |
|---|---|---|---|
| Airplane Construction Kit | MACUSER | Nov. 85 | p. 36 |
| Astronomy V2.8 | MACUSER | Apr. 86 | p. 79 |
| Calculator Construction Set | MACWORLD | Aug. 86 | p. 134 |
| Comet Halley | MACUSER | Apr. 86 | p. 81 |
| Comet Halley | MACUSER | Jan. 86 | p. 32 |
| Developing a Megabyte Strategy | MACWORLD | Apr. 86 | p. 80 |
| DietMac | MACUSER | May 86 | p. 38 |
| Dinner At Eight | MACUSER | Jan. 86 | p. 32 |
| Entrepreneur | MACAZINE | Vol.2 No.12 | p. 80 |
| Front Desk | MACUSER | Dec. 85 | p. 36 |

## Articles of Interest—Miscellaneous

| | | | |
|---|---|---|---|
| Front Desk | INFOWORLD | July 21, 86 | p. 34 |
| Hippo Almanac | MACUSER | Jan. 86 | p. 33 |
| LogiMac (digital logic design) | MACAZINE | Vol.3 No.1 | p. 96 |
| Macintosh vs. IBM Software | INFOWORLD | June 30, 86 | p. 26 |
| Mac Memory Disk | A+ MAGAZINE | Mar. 85 | p. 86 |
| Mac Memory Disk | ICON REVIEW | Summer 85 | p. 26 |
| RAM DISK | MACWORLD | June 85 | p. 32 |
| MacLabeler | ICON REVIEW | Summer 85 | p. 26 |
| MacPlus System | MACWORLD | Apr. 86 | p. 86 |
| MacSpin | MACUSER | June 86 | p. 40 |
| Macstronomy | MACUSER | Apr. 86 | p. 80 |
| Mind Prober | MACAZINE | Apr. 85 | p. 43 |
| Mind Prober | MACWORLD | Nov. 85 | p. 149 |
| SCSI Macport | A+ MAGAZINE | Feb. 86 | p. 157 |
| SmoothTalker | MACAZINE | Mar. 85 | p. 49 |
| Speeding Up the Mac | MACWORLD | Aug. 86 | p. 88 |
| Starting a New Business | MACUSER | Dec. 85 | p. 36 |
| StatView | MACUSER | Dec. 85 | p. 38 |
| StatView | MACUSER | May 86 | p. 46 |
| StatWorks | MACUSER | May 86 | p. 46 |
| Stella | MACAZINE | May 86 | p. 53 |
| Time Base (Calendar) | A+ MAGAZINE | Nov. 85 | p. 164 |
| Tellstar | MACAZINE | Vol.3 No.1 | p. 62 |
| Tellstar I & II | MACUSER | Apr. 86 | p. 82 |
| Virtually Free Software | NIBBLE | May/June 86 | p. 58 |

## Articles of Interest—Music

| | | | |
|---|---|---|---|
| Enhancing a Music Program | MACAZINE | June 86 | p. 28 |
| Concertware | MACAZINE | Mar. 85 | p. 29 |
| Deluxe Music Construction Set | MACUSER | Mar. 86 | p. 75 |
| Deluxe Music Construction Set | MACUSER | Feb. 86 | p. 34 |
| Deluxe Music Construction Set | MACAZINE | Vol.2 No.12 | p. 84 |

| | | | |
|---|---|---|---|
| MAC Music | MACAZINE | Mar. 85 | p. 34 |
| Midi for the Macintosh | A+ MAGAZINE | Feb. 86 | p. 117 |
| Music Character Set | MACAZINE | Mar. 85 | p. 34 |
| Music Software | MACWORLD | Feb. 86 | p. 92 |
| MusicType | MACAZINE | Mar. 85 | p. 34 |
| Music on the Mac | MACAZINE | Vol. 3 No. 3 | p. 56 |
| MusicWorks | MACWORLD | June 85 | p. 74 |
| MusicWorks | MACAZINE | Mar. 85 | p. 34 |
| MusicWorks | A+ MAGAZINE | May 85 | p. 113 |
| Professional Composition | MACAZINE | June 85 | p. 12 |
| Professional Composer V2 | MACWORLD | Feb. 86 | p. 109 |
| Professional Composer V2 | MACAZINE | Vol.2 No.12 | p. 85 |
| Total Music | MACUSER | Jan. 86 | p. 34 |

# Articles of Interest—Spreadsheets

| | | | |
|---|---|---|---|
| Crunch | INFOWORLD | Aug. 12, 85 | p. 47 |
| Crunch | MACUSER | Jan. 86 | p. 61 |
| Excel versus Jazz | INFOWORLD | May 20, 85 | p. 17 |
| Excel for the MAC | INFOWORLD | May 27, 85 | p. 28 |
| Excel | MACUSER | Dec. 85 | p. 41 |
| Excel Macros | MACWORLD | Dec. 85 | p. 69 |
| MACROMAKER New for Excel | MACUSER | Dec. 85 | p. 40 |
| Excel Functions | A+ MAGAZINE | Mar. 86 | p. 141 |
| Jazz Ships to Eager Dealers | INFOWORLD | June 10, 85 | |
| Jazz | ICON REVIEW | Summer 85 | p. 1 |
| Jazz | INFOWORLD | July 22, 85 | p. 16 |
| Jazz | INFOWORLD | July 22, 85 | p. 41 |
| Jazz | MACWORLD | Jan. 86 | p. 96 |
| Jazz | MACWORLD | Mar. 86 | p. 23 |
| Multiplan (Financial Planning) | MACWORLD | May 85 | p. 92 |
| Click On Worksheet | INFOWORLD | July 29, 85 | p. 50 |
| Multiplan | MACUSER | Mar. 86 | p. 61 |
| Common Spreadsheet Mistakes | MACUSER | Aug. 86 | p. 47 |
| Ensemble | INFOWORLD | May 20, 85 | p. 47 |

## Articles of Interest—Spreadsheets

| | | | |
|---|---|---|---|
| Ensemble | ICON REVIEW | Summer 85 | p. 3 |
| Ensemble | MACUSER | July 86 | p. 50 |
| Excel Databases | MACWORLD | June 86 | p. 116 |
| Executive Office | MACWORLD | July 86 | p. 108 |
| Integrated Software MeetsMac | POP. COMP. | June 85 | p. 11 |
| Jazz, Excel, and Crunch | NIBBLE | Nov. 85 | p. 52 |
| Microsoft Integrated Series | POP. COMP. | June 85 | p. 104 |
| Spreadsheets for the Mac | POP. COMP. | Aug. 85 | p. 12 |
| Quartet | MACUSER | July 86 | p. 50 |
| Quartet | ICON REVIEW | Summer 85 | p. 4 |

## Articles of Interest—Telecommunications

| | | | |
|---|---|---|---|
| MacTerminal | MACUSER | Dec. 85 | p. 85 |
| Apple Modem/MacTerminal | A+ MAGAZINE | Mar. 85 | p. 11 |
| ProModem 1200 | MACWORLD | Vol.3 No.3 | p. 23 |
| AppleTalk | MACUSER | Mar. 86 | p. 68 |
| HabaCom | MACAZINE | Vol. 2 No.12 | p. 14 |
| InTouch | MACWORLD | Dec. 85 | p. 90 |
| InTouch V2 | MACAZINE | Vol. 2 No.12 | p. 23 |
| InTouch 2.05 | NIBBLE | May/June 86 | p. 41 |
| MacCommunications | A+ MAGAZINE | Jan. 86 | p. 137 |
| MACMODEM | MACWORLD | Apr. 85 | p. 94 |
| MACPhone | COMP. & ELEC. | Mar. 85 | p. 38 |
| MicroPhone 1.0 | NIBBLE | May/June 86 | p. 40 |
| Microphone | MACUSER | July 86 | p. 69 |
| Microphone | MACWORLD | July 86 | p. 133 |
| Mite V2.9 | MACAZINE | Vol. 2 No. 12 | p. 15 |
| PC TO MAC AND BACK | INFOWORLD | Mar. 18, 85 | p. 47 |
| Pro Com-M 1.65 | MACAZINE | Vol. 2 No. 12 | p. 18 |
| Red Ryder | MACWORLD | Dec. 85 | p. 92 |
| Red Ryder 6.0 | MACAZINE | Vol. 3 No.1 | p. 91 |
| Red Ryder 6.2c | MACAZINE | Vol. 2 No.12 | p. 21 |
| Red Ryder 7.0 | NIBBLE | May/June 86 | p. 43 |
| Red Ryder | MACUSER | July 86 | p. 71 |

## Articles of Interest—Telecommunications

| | | | |
|---|---|---|---|
| Smartcom | MACUSER | July 86 | p. 72 |
| Smartcom II | MACAZINE | Vol.2 No.12 | p. 22 |
| Smartcom II | MACWORLD | Dec. 85 | p. 88 |
| Smartcom II | A+ MAGAZINE | Nov. 85 | p. 14 |
| Smartcom II 2.1D | NIBBLE | May/June 86 | p. 39 |
| Telescape | MACAZINE | Vol. 2 No.12 | p. 20 |
| VersaTerm | MACAZINE | Vol. 2 No. 12 | p. 26 |

## Miscellaneous Articles

| | | | |
|---|---|---|---|
| Going On-Line with Excel | MACWORLD | July 86 | p. 126 |
| Macintosh Networks | MACWORLD | June 86 | p. 127 |
| Mini & Mainframe Connections | MACWORLD | July 1986 | p. 121 |
| Modems | MACUSER | Feb. 86 | p. 74 |
| The PBX Connection | MACWORLD | July 86 | p. 123 |
| Unix to Mac Networks | MACWORLD | June 86 | p. 129 |

# Articles of Interest—Utilities

| | | | |
|---|---|---|---|
| Accessory Pak I | MACUSER | Nov. 85 | p. 3 |
| Accessory Pak I | NIBBLE | Nov. 85 | p. 78 |
| Banner Maker | MACWORLD | Nov. 85 | p. 166 |
| Copy II Mac | MACUSER | June 86 | p. 49 |
| Catalog Keeper | MACUSER | Aug. 86 | p. 92 |
| DA Installer | A+ MAGAZINE | Aug. 86 | p. 99 |
| Disk Info | MACUSER | Aug. 86 | p. 96 |
| Disk Ranger | MACUSER | Aug. 86 | p. 94 |
| Document Compare | MACUSER | May 86 | p. 37 |
| Extras | MACUSER | Aug. 86 | p. 94 |
| F Key Installer | MACWORLD | Aug. 86 | p. 102 |
| FlashFinder V2.1 | MACAZINE | Vol.3 No.3 | p. 20 |
| HFS Backup | MACUSER | Aug. 86 | p. 94 |
| The HouseKeeper | MACUSER | Dec. 85 | p. 35 |
| Icon Switcher 1.2 | A+ MAGAZINE | Aug. 86 | p. 101 |
| MacDisk Catalog | MACUSER | Dec. 85 | p. 35 |
| MacExpress | MACUSER | Feb. 86 | p. 33 |
| MacMate | MACWORLD | Nov. 85 | p. 151 |
| MacMemory Disk | MACUSER | June 86 | p. 36 |
| MacPlot | MACUSER | Dec. 85 | p. 34 |
| MacQWERTY | MACUSER | July 86 | p. 33 |
| MacTracks | A+ MAGAZINE | Nov. 85 | p. 173 |
| MacZap | MACUSER | Jan. 86 | p. 32 |

## Articles of Interest—Utilities

| | | | |
|---|---|---|---|
| MenuEdit 1.0 | A+ MAGAZINE | Aug. 86 | p. 100 |
| Mock Printer | MACUSER | Aug. 86 | p. 98 |
| MockTerminal | MACUSER | Aug. 86 | p. 98 |
| MockWrite | MACUSER | Aug. 86 | p. 98 |
| My Disk Labeler | MACWORLD | Aug. 86 | p. 135 |
| My Disk Labeler V1 | MACAZINE | Vol.3 No.3 | p. 19 |
| Packer | MACUSER | June 86 | p. 36 |
| Packer | MACWORLD | Aug. 86 | p. 142 |
| Paint Cutter | MACWORLD | Nov. 85 | p. 129 |
| PaintMover | MACWORLD | Aug. 86 | p. 101 |
| Print Spoolers | MACUSER | Aug. 86 | p. 58 |
| Q + D Filer | MACUSER | Aug. 86 | p. 94 |
| RAM Start | MACWORLD | Aug. 86 | p. 100 |
| REdit | A+ MAGAZINE | Aug. 86 | p. 100 |
| Sort Menu | A+ MAGAZINE | Aug. 86 | p. 100 |
| Switcher | MACUSER | Aug. 86 | p. 98 |
| Switcher | INFOWORLD | July 22, 85 | p. 40 |
| Switcher | MACUSER | Dec. 85 | p. 120 |
| Switcher | MACUSER | June 86 | p. 48 |
| Tempo | MACAZINE | June 86 | p. 89 |
| Tempo | MACUSER | July 86 | p. 38 |
| Timebase | MACWORLD | June 86 | p. 150 |
| TopDesk | MACWORLD | June 86 | p. 137 |
| TopDesk | MACUSER | May 86 | p. 36 |
| TypeNow | MACUSER | Jan. 86 | p. 36 |
| Transfer 2.0 | MACWORLD | Aug. 86 | p. 100 |
| Waystation 1.9B | MACWORLD | Aug. 86 | p. 100 |

## Articles of Interest—Word Processing

| | | | |
|---|---|---|---|
| ACTA (desk accessory outliner) | MACUSER | July 86 | p. 32 |
| Document Modeler | MACWORLD | Aug. 86 | p. 104 |
| Font Librarian | A+ MAGAZINE | Aug. 86 | p. 99 |
| Fontographer | MACWORLD | July 86 | p. 142 |
| Fontographer | MACAZINE | May 86 | p. 45 |

| | | | |
|---|---|---|---|
| Hayden Speller | MACWORLD | Jan. 86 | p. 131 |
| Hayden Speller | MACAZINE | June 86 | p. 81 |
| Hayden Speller | MACWORLD | July 86 | p. 105 |
| Liberty Spell-Checker | MACWORLD | July 86 | p. 103 |
| MacGas | MACWORLD | July 86 | p. 105 |
| MacIndexer | MACUSER | July 86 | p. 33 |
| MacIndexer | MACWORLD | June 86 | p. 138 |
| MacLightning | MACWORLD | July 86 | p. 103 |
| Mac•Spell•Right | A+ MAGAZINE | Feb. 85 | p. 100 |
| Mac•Spell•Right | MACWORLD | July 86 | p. 106 |
| Mac•Spell•Right | MACAZINE | June 86 | p. 83 |
| MacSpell + | ICON REVIEW | Summer 85 | p. 10 |
| MacSpell+ | MACWORLD | Mar. 86 | p. 130 |
| MacSpell+ | MACAZINE | June 86 | p. 82 |
| MacSpell+ | MACWORLD | July 86 | p. 106 |
| Microsoft Word | INFOWORLD | Apr. 22, 85 | p. 42 |
| Microsoft Word | MACAZINE | Mar. 85 | p. 43 |
| Word | ICON REVIEW | Summer 85 | p. 10 |
| Microsoft Word Features | MACWORLD | Apr. 86 | p. 112 |
| EGWORD (Japanese WP) | MACUSER | Apr. 86 | p. 60 |
| Outline Processors | MACWORLD | Aug. 86 | p. 61 |
| Set Default Font | A+ MAGAZINE | Aug. 86 | p. 104 |
| RightWord | MACAZINE | June 86 | p. 83 |
| RightWord | MACWORLD | July 86 | p. 106 |
| Professional Bibliographic System | MACWORLD | Jan. 86 | p. 45 |
| Professional Bibliographic System | MACUSER | Feb. 86 | p. 33 |
| Professional Bibliographic System | MACAZINE | Vol.3 No.3 | p. 34 |
| SpellSwell | MACUSER | May 86 | p. 38 |
| SpellSwell | MACWORLD | July 86 | p. 106 |
| SpellSwell V1.2c | INFOWORLD | July 14, 86 | p. 53 |
| ThinkTank | MACUSER | Jan. 86 | p. 52 |
| ThinkTank 512 | A+ MAGAZINE | May 85 | p. 102 |
| ThinkTank 512 | INFOWORLD | July 29, 85 | p. 45 |
| ThinkTank 512 | MACWORLD | Apr. 86 | p. 106 |

## Articles of Interest—Word Processing

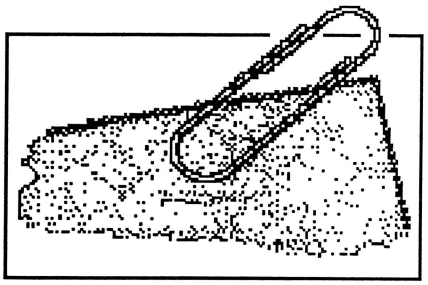
### Miscellaneous

| | | | |
|---|---|---|---|
| ABC's of Desktop Publishing | MACUSER | June 86 | Suppl. |
| The Business of Desktop Publish. | MACUSER | June 86 | Suppl. |
| Creating Resumes | MACUSER | June 86 | p. 91 |
| Desktop Publishing Directory | MACUSER | June 86 | Suppl. |
| The Scoop on Newsletters | MACUSER | June 86 | Suppl. |
| Secrets of Word | MACUSER | June 86 | Suppl. |
| You're My Type | MACUSER | June 86 | Suppl. |
| Word Processing Checklist | A+ MAGAZINE | Nov. 85 | p. 35 |
| Just Text | MACUSER | Dec. 85 | p. 76 |
| MacAuthor | MACAZINE | Vol. 3 No.1 | p. 60 |
| PageMaker | MACWORLD | Mar. 86 | p. 11 |
| PageMaker | MACUSER | June 86 | Suppl. |
| ReadySetGo | MACUSER | Apr. 86 | p. 69 |

### Fonts

| | | | |
|---|---|---|---|
| ClickArt Letters | A+ MAGAZINE | Jan. 86 | p. 146 |
| Decowriter | A+ MAGAZINE | Jan. 86 | p. 146 |
| Font Agenix | A+ MAGAZINE | Jan. 86 | p. 147 |
| FONTastic | MACUSER | Dec. 85 | p. 38 |
| FONTastic | MACWORLD | Feb. 86 | p. 126 |
| FONTastic | MACAZINE | Vol.3 No.3 | p. 55 |
| Font Explorer | MACAZINE | Vol.3 No.3 | p. 20 |
| Fluent Fonts | ICON REVIEW | Summer 85 | p. 25 |
| Fluent Fonts | A+ MAGAZINE | Jan. 86 | p. 147 |
| Headline Graphics | A+ MAGAZINE | Jan. 86 | p. 147 |
| Kensington Professional Fonts | A+ MAGAZINE | Jan. 86 | p. 148 |
| Mac The Knife: World Class Fonts | A+ MAGAZINE | Jan. 86 | p. 148 |
| More Fun with FONTastic | MACAZINE | Vol.3 No.3 | p. 58 |
| Sci Fonts | MACAZINE | Vol.3 No.3 | p. 20 |
| Superfonts | A+ MAGAZINE | Jan. 86 | p. 148 |
| Tech: Math Science Fonts | A+ MAGAZINE | Jan. 86 | p. 149 |
| UltraFonts Edition 2 | A+ MAGAZINE | Jan. 86 | p. 149 |

# Project Reports



This section of *Wheels for the Mind* presents many of the projects that are being developed at various colleges and universities. The listings are not restricted to Consortium schools or to schools in this country; you will find projects that are being done at universities all over the world. Project listings that appeared in the previous issue appear here in an abbreviated form; new listings and listings that have been updated are described in more detail (when available), and are indicated by an apple in their heading.

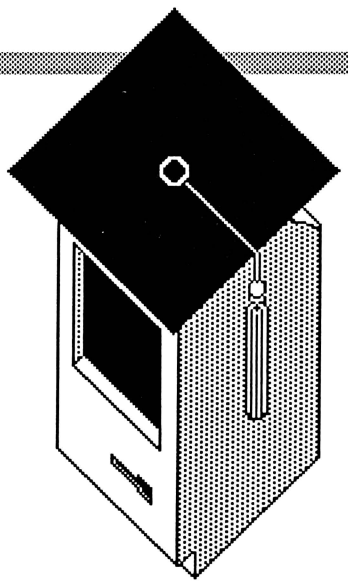
Some of the items listed here are just in the beginning stages, while others are completed and ready for distribution.

Wherever possible, we have tried to list an appropriate contact in case you are interested in finding out more about a particular listing.

One of the original intents of organizing educational institutions around the Macintosh was to provide opportunities for creative people to share their expertise and talents. We are sure that you will find much of that creativity in evidence here.

Please feel free to collaborate on developing an application, to develop one on your own, or to simply use one that was developed by one of your colleagues.

Most important, let us know what YOU are working on. Perhaps there are others around the world who might like to work with you! Send us a description of your project.



# Astronomy

## Instrument Panel

Robert Loewenstein of Yerkes Observatory is developing a remote-control "instrument panel," written on a Macintosh 512K in a beta release of Kriya Systems' Neon, for use with a new 3.5-meter telescope to be built in New Mexico. For further information, see the winter 1986 issue of *Wheels for the Mind.*

**Current status**: Running and under continued development.

**Contact**: Robert Lowenstein, Sr. Research Associate, Dept. of Astronomy and Astrophysics, Yerkes Observatory, P.O. Box 0258, Williams Bay, Wisconsin 53191; (414) 236-5468

## Spaceflight Instrument Data Collection

The Laboratory for Astrophysics and Space Research is using a Lisa computer to perform bench tests, accelerator calibration, and eventually, data collection from spaceflight instruments that measure cosmic rays.

**Current status**: In use.

**Contact**: William Sterner, Lead Staff Analyst, Information Technologies and New Services Computation Center, University of Chicago, 5737 University Ave., Chicago, IL 60637; (312) 962-7172 STAFF.BILL@UCHICAGO

# Biology

## Botanical Classification

A plant identification program that enables students to identify any one of 90 different shrubs and trees in the local environment. Identifies all flora native to the immediate area around Drexel University.

**Current status**: Classroom testing.

**Contact**: Coordinator, Microcomputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104

## Identifying Biological Specimens

AUTOKEY is an interactive system (written in Absoft's FORTRAN) that is designed to provide quick and accurate identifications of biological specimens for people with little direct experience in biological identification.

**Current status**: Complete.

**Contact**: Dr. Ron Hellenthal, Dept. of Biology, University of Notre Dame, Notre Dame, IN 46556

# Biology

## Evaluation of Natural Habitats

ERAPT is an interactive information retrieval and analysis system that permits the evaluation of natural habitats and organism assemblages using stored information on the environmental requirements and pollution tolerances of biological species.
**Current status**: A prototype version of this system is currently running on a Macintosh 512K. A full implementation of the system on the Macintosh XL is planned.
**Contact**: Dr. Ron Hellenthal, Dept. of Biology, University of Notre Dame, Notre Dame, IN 46556

## Labtutor

Labtutor (Lisa Pascal) is a package that uses its own command interpreter to process procedure files into interactive laboratory tutorials that present complicated analytical procedures as simple step-by-step instruction sets.
**Current status**: Unknown.
**Contact**: Dr. Ron Hellenthal, Dept. of Biology, University of Notre Dame, Notre Dame, IN 46556

## DNA Analysis

The Cornell DNA analysis package, which allows the user to perform various types of pattern-matching analyses on strings of DNA and RNA, has been adapted to the Macintosh.
**Current status**: Complete.
**Contact**: Craig McGowan, Computer Center, University of Rochester, 727 Elmwood Avenue, Rochester, NY 14620

## Heat Exchange in Animals

This program consists of interactive instructional material on the physical laws governing heat transfer and a simulation of the thermoregulatory strategies adopted by animals.
**Current status**: Near completion.
**Contact:** Mike Barlow or Karen Lee, IRIS, Cypress Hall, Stanford University, Stanford, CA 94305

## Simulation Modeling in Population Biology

The following programs are written in Macintosh Pascal and most will run on a 128K Macintosh. Descriptions of programs completed to date:

1. Selection for 2 or 3 alleles at 1 locus, with or without inbreeding. This program plots trajectories for different starting combinations of gene frequencies in triangular coordinates for the 3 gene frequencies. It allows students to see the complexities introduced by adding another allele to the standard 2 allele at 1 locus model, and also the effects of mating structure.

# Biology

## Simulation Modeling in Population Biology

2. Selection for 2 alleles at 2 loci. This program plots the frequency of 2 alleles at 2 loci in x, y coordinates, starting either at linkage equilibrium, or with specified gametic frequencies that are not in linkage equilibrium (and for different linkage frequencies ($0 \leq R \leq .5$) if the alleles are on the same chromosome). This model can be used productively with the first to evaluate the effects of adding a second locus, and the interaction of gametic levels of organization with different recombination frequencies and epistatic interactions in producing qualitatively different outcomes from those possible with 2 alleles at 1 locus. Further developments of this program will include the addition of inbreeding and a discussion of how this model can be used to illustrate some multilevel selection effects.

3. Single-species population growth model. This model calculates and plots population growth for the logistic or minimum-density limited logistic growth equations. It scales the graph automatically in the horizontal direction to show up to 400 generations, but plotting can start in any generation. You may plot one curve for a given r value, or a family of curves between r and rmax, with increment delta r. You may also plot effective population size vs. r for a range of r values, and choose to plot points only or connect them with lines. This program can be used to demonstrate effectively the occurrence and importance of chaotic behavior in ecological systems, and a comparison of the onset of chaos and periodic oscillations in the logistic and minimum-density-limited-logistic models. Further developments of this program will include the addition of a variety of other single-species growth equations for comparative analysis.

4. Linkage mapping. This program is mainly of historical interest, but also has current utility. It was originally designed as a graphic conversion of two calculator programs I use to let students compare the predictions of the linear linkage model of the chromosome with the non-linear "Rat Trap" model of W. B. Castle. The first program graphs the Haldane mapping function (relating map distance to observed recombination frequency), compares it to the linear prediction of Castle, and allows for input of real data for comparison. A second option (not yet implemented) will allow the construction of the chromosome map according to Castle's hypothesis to test it against real data. I plan to add other mapping functions (due to Haldane, Kosambi, Felsenstein, and others), to allow comparative evaluation of the performance of different mapping functions.

5. Competition communities. This program graphs population sizes in successive generations for N species interacting according to the Lotka-Volterra equations generalized (after Gilpin) to allow for the presence of a refugum in which a proportion of each population is protected from density-dependent effects. It prompts for the time interval between generations, the number of species, the refugum size, and the parameters for each species (N, r, K, and the interaction coefficients, Cij.) Further developments will allow the inclusion of equations other than those of the Lotka-Volterra community for comparative analysis.

# Biology

## Simulation Modeling in Population Biology

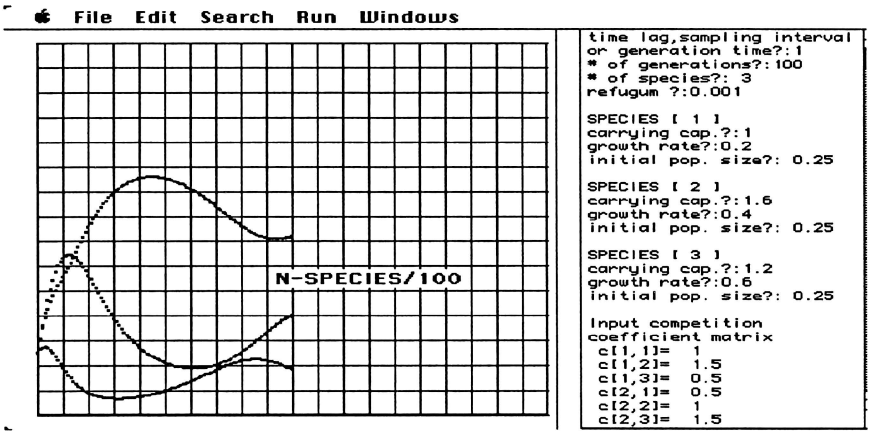
The selection and competition communities models allow you to either generate graphs with minimal text output to the screen (model, parameter values, and starting and ending values for the relevant variables), or send a complete data dump of the values of all relevant variables in each generation to the printer. The selection models allow you to plot either single trajectories or families of them (to generate a vector field). The programs range in size from 4K to 9K. They are currently in between alpha and beta test stages. Also included are three short separate graphics utility programs that are used in one form or another in the preceding programs.

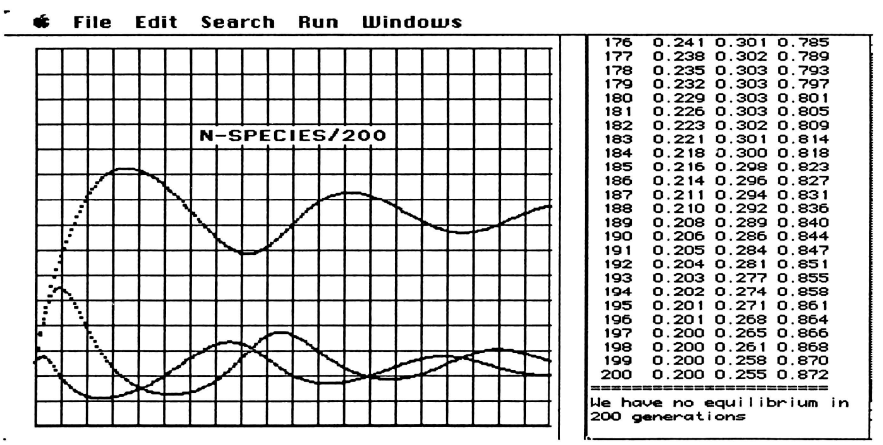
I am writing a computational lab manual for population biology that will include these and perhaps six to eight more programs, with full documentation, program listings, proposed laboratory exercises, discussion of relevant theory, and a bibliography of literature having data from empirical cases. It will be marketed with an (inexpensive) disk containing the programs. The aim will be not only to give students hands-on experience with the major models in the field, but also to teach them about the strengths, limitations, problem solving heuristics, and techniques of model building. I have already used these programs in an introductory course in evolution and genetics at the University of Chicago, and find that the ease and graphic force of these programs makes it possible to discuss models with unspecialized undergraduates that would normally be taught only to specialists at the graduate level.

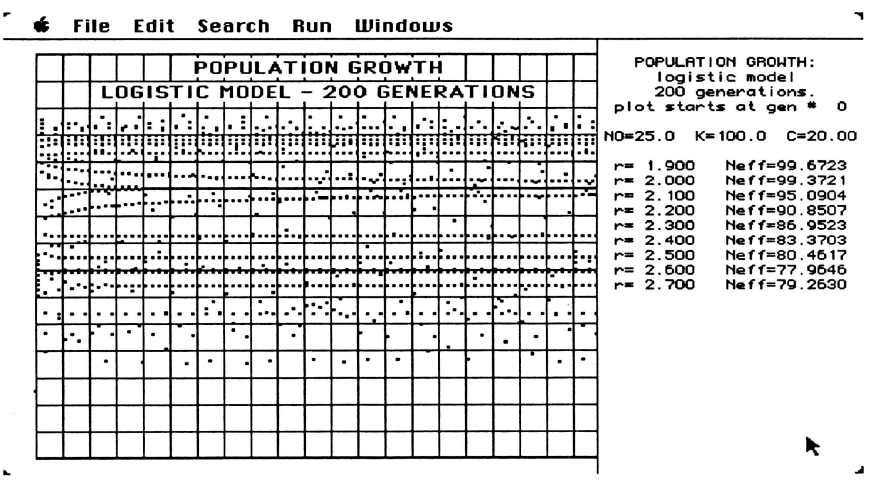
I welcome suggestions, either about these programs, or about other models you would like to see included in such a package. (Planned additions will include: binomial distribution/model of blending inheritance, inheritance and selection of quantitative traits, other growth equations for single and multispecies communities, age-structured population growth [with and without density limitations], frequency-dependent selection, group selection, and genetic drift.) Those wishing to try the programs in their current state can do so by sending a check for $25 for a disk, program listings, sample output, and (currently minimal) documentation. All programs and materials are copyrighted.
**Current Status:** Unknown.
**Contact:** William C. Wimsatt, Department of Philosophy, 1050 E. 59th St., University of Chicago, Chicago, IL 60637; (312) 962-8598

# Biology

## Simulation Modeling in Population Biology

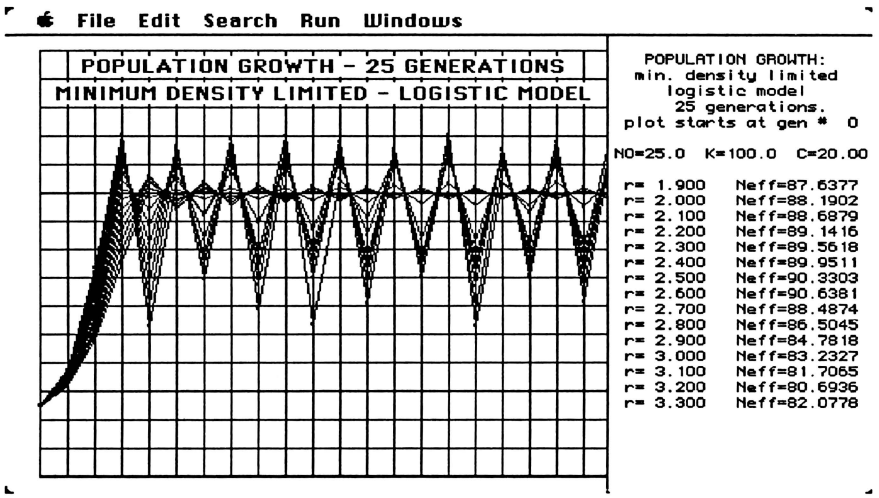


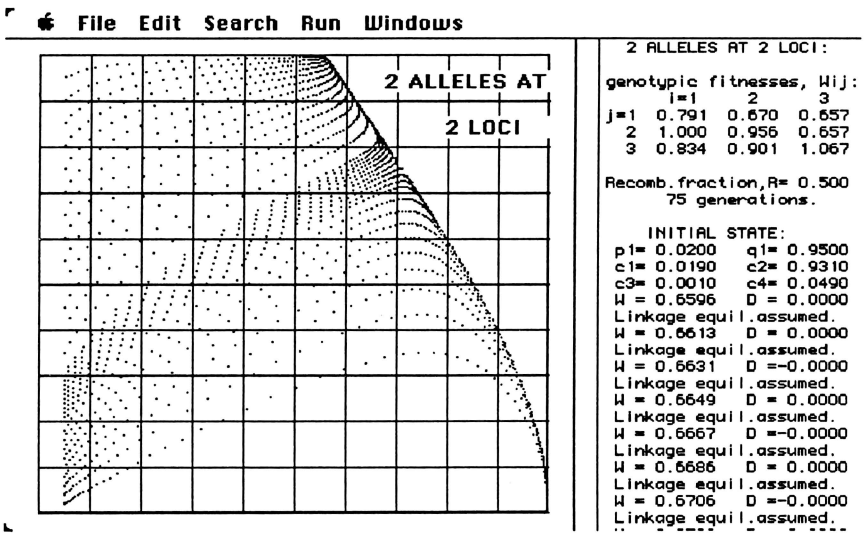



# Biology

## Simulation Modeling in Population Biology




## Evolutionary Properties of Genetic Regulatory Networks

The programs under development are extensions of Stuart A. Kauffman's models on the evolution of cellular gene control networks. (See his "Self-Organization, Selective Adaptation and Its Limits: A New Pattern of Inference in Evolution and Development" in Evolution at a Crossroads: The New Biology and the New Philosophy of Science, ed. D. J. Depew and B. H. Weber, MIT,1985.) Kauffman investigates the importance of "generic properties" of genetic networks under the influence of selection and mutation. (A generic property is one that is found in virtually all members of an ensemble of networks that are randomly constructed subject to certain general constraints, such as the number of genes and the number of connections among them.)

# Biology

## Evolutionary Properties of Genetic Regulatory Networks

The thesis of Kauffman's work is that generic properties, being overwhelmingly probable under random construction and mutation, are products of general structural constraints, rather than of selection. In his simulations, fitness is calculated simply as a function of the number of correct connections relative to a "perfect" network. We provide programs for simulating the evolution of genetic networks under selection and mutation for which fitness is calculated as a function of specific and detailed connectivity properties of the "perfect" network. This more detailed information allows empirical testing of W. C. Wimsatt's "developmental lock" models of developmental constraints as products of "generative entrenchment." (Generative entrenchment is a measure of how many features or traits of the phenotype depend upon a given feature for their proper expression. Simulations have already shown that there are generic thresholds [with respect to gene/connection ratios] at which well-entrenched subnetworks can be maintained by weak selection even against very high mutation rates.)

All programs are written in ExperLisp, which produces natural and compact code. (Kauffman's C code is 1500 lines. The core of ours is 150. With front end and graphics, it is 400.) A simulation of the evolution of 100 organisms for 2000 generations, each with 20 genes and 20 connections, with selection and a mutation rate of .0001 per connection end, runs on a 512K Macintosh in less than six hours. This is roughly 30 times as fast as Kauffman's comparable simulations ran in C on a Digital Equipment Corporation DEC 11-03. It is likely that ExperLisp code will provide similar advantages for simulations involving populations with genetic and/or spatial structure, and we plan to try these in the near future.

**Contact:** This work is being done by Jeffrey Schank, (mail: c/o Committee on Conceptual Foundations of Science, 1126 East 59th Street, University of Chicago, Chicago, Ill., 60637; (312) 288-7021) with Prof. William C. Wimsatt, Department of Philosophy, 1050 East 59th Street, University of Chicago, Chicago, Il., 60637; (312) 962-8598.

# Chemistry

## Prelabs

A series of programs that enable students to test their understanding of concepts and procedures they will be using in their chemistry laboratory sessions, written with the Lesson-Writer authoring tool.
**Current status**: Available from ACE (Kinko's Academic Courseware Exchange, 800-235-6919; in California, 800-292-6640).
**Contact**: Coordinator, Microcomputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104

# Chemistry

## Orbital Mixing

Orbital Mixing depicts the molecular orbitals derived from the 1p orbitals overlapping the PI manner.
**Current status**: Finished and being used in intermediate-level chemistry courses.
**Contact**: The Personal Computing Center, 1 McNutt Hall, Dartmouth College, Hanover, NH 03755; (603) 646-3249

## Mutiple-Step Diffusion in Solids

Professor Robert Huggin's program demonstrates the effect of a two-step diffusion process on the composition profiles within solids. The simulation can be completed under different environmental conditions, producing different profiles.
**Current status:** In progress.
**Contact:** Professor Robert R. Huggins, Department of Material Science, Stanford University, Stanford, CA; 94305

## MacStereo

MacStereo illustrates the Cahn-Ingold-Prelog stereochemical designation system; presents the correct designation procedure for molecules with one chiral center, using static text and four interactive examples; and presents nine interactive problems of increasing complexity.
**Current status**: In development.
**Contact**: Coordinator, Microcomputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104

## PeriChart

A data base of atoms and elements that uses the periodic chart as a control structure, allowing the user to obtain data for such properties as isotopic masses and abundances, electronegativities, oxidation states, and valence electron configurations.
**Current status**: Available from ACE (Kinko's Academic Courseware Exchange, 800-235-6919; in California, 800-292-6640).
**Contact**: Coordinator, Microcomputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104

## Quantum Chemistry

(1) Particle in one-dimensional box with finite wall.
(2) Simple Huckel molecular orbital.
(3) Ab initio self-consistent field molecular orbital plus configuration interaction.
These are all being cleaned up for easy access by the novice user.
**Current status**: Used (1) in freshman honors chemistry, (2) with junior physical chemistry students, and (3) with seniors and graduate students. (Absoft's FORTRAN.)
**Contact**: Dr. Maurice E. Schwartz, Department of Chemistry, University of Notre Dame, Notre Dame, IN; (219) 239-7744

# Chemistry

## Multiplan Spreadsheets

EquilCalc provides a tool for solving equilibrium concentrations in the general reaction aA+bB=rR+sS, given initial concentrations and the equilibrium constant. AcidBaseTitr generates a plot (within Multiplan) of pH vs. added base for the titration of a weak acid with a strong base. Molmass is a simple molecular weight and percent composition calculator.
**Current status**: Available from Kinko's Academic Courseware Exchange (ACE).
**Contact**: Kinko's Academic Courseware Exchange, 800-235-6919; in California, 800-292-6640

## Reaction Rates

A simulation in chemical kinetics that computes time-dependent concentrations of a chemical reaction after initial concentrations of reactants and temperature are specified.
**Current status**: Classroom testing.
**Contact**: Coordinator, Microcomputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104

## Vistas in Chemistry (MacVIC)

The goal is to develop highly visual, animated graphics that illustrate chemical and physical phenomena; suitable for first-year courses.
**Current status**: Unknown.
**Contact**: Dr. Russ Larsen, Department of Chemistry, Texas Tech University, Lubbock, TX 79409; (806) 742-3057

## Organic Molecular Structures

This project explores the feasibility of using the Macintosh to generate complex organic molecular structure to aid in teaching organic chemistry.
**Current status**: Completed.
**Contact**: Roy Roberts, Chemistry, College of Natural Sciences, University of Texas, Austin, TX 78712

## BenchTop Application: NMR Spectroscopy

NMRSystem allows a Macintosh to run, display, and store NMR spectra from a Varian EM-360 NMR Spectrometer. It was developed by Adam Whiting, a chemistry senior at Reed College.
**Current status**: Completed.
**Contact**: Marianne Colgrove , Education and Documentation Coordinator, Development Lab, Reed College, Portland, OR 97202; (503) 771-1112 ext. 277

## Molecular Weight Calculator

A desk accessory for computing the molecular weight of a formula. Both the formula and the molecular weight can be copied, cut, and pasted into other applications or into the standard calculator desk accessory. The molecular weight

is based on atomic masses accepted as standard reference data.
**Current status**: Classroom testing.
**Contact**: Coordinator, Microcomputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104

## Molecular Weight Calculator

This program utilizes the X-ray crystallographic coordinates of a protein to generate three-dimensional images of the protein's structure. The actual picture drawn is based on a series of simple commands such as TRACE, BACKBONE, and SIDECHAIN that specify the portion of the structure to be shown on the screen. The image can be viewed either in mono mode or as a stereo pair. The portion of the structure displayed on the screen can be rotated about the x, y, and z axes individually or simultaneously.
**Current status**: Unknown.
**Contact**: Evan R. Kantrowitz, Department of Chemistry, Boston College, Chestnut Hill, MA 02167

## 3D Protein Structures

Simple Huckel Molecular Orbital (HMO) calculations can now be done using the programs NDChem HMO. These perform HMO calculations in a straightforward way suitable for student use. A conventional sequence of "bonds" (connections) is automatically generated; new bonds can then be added by the user, or unwanted bonds removed. Atomic/bond integral parameters (the coulomb, or alpha; and the resonance, or beta) are first set at standard values; the user may change them as desired to introduce "heteratoms." Various options are provided for computation of energies, charge/bond orders, and other calculations, and for displaying and saving results. The programs provide examples for honors/advanced first-year chemistry courses. Physical chemistry students use them to do their own HMO calculations.
**Current status**: Working programs are now being used and distributed; small changes are made as user experience grows.
**Contact**: Kinko's Academic Courseware Exchange, 800-235-6919; in California, 800-292-6640

## Huckel Molecular Orbital Theory

Fitting raw or converted data to other raw or converted data is commonplace in chemistry and other science and engineering disciplines. We can now perform least-squares analyses up to 10th-degree polynominals using NDChemFit/Draw. The programs provide a variety of useful features, such as data error checking and correction; data-set modification (addition, deletion, switching); successive, different analyses of the same data; conversion of "raw" to "analyzable" data with additive/scaling transformations; conversion of data through mathematical transformations (logarithmic, powers, and others); graphic display of raw data, transformed data, and results of fitting; saving of numerical and graphical results. The programs are routinely used in honors/advanced first-year chemistry and in physical chemistry, and are spread about the campus in various uses.

## Chemical Curve Fitting

# Chemistry

## Chemical Curve Fitting

**Current status**: Working programs are being distributed; small changes are made as user experience grows.
**Contact**: Dr. Maurice E. Schwartz, Department of Chemistry, University of Notre Dame, Notre Dame, IN 46556; (219) 239-7744

## Periodic Table Tool

Periodic Table Tool utilizes the periodic table to organize chemical information, and displays this data in tabular and graphical form. It allows a periodic table to be designed by simply dragging elements to the desired position on the desktop. A maximum of ten different tables may be created, and each is displayed via menu options. Users can declare attributes (electronegativity, atomic weight, covalent radius), and enter data for individual elements. The data for all the attributes may be shown for an element using a periodic table. This information may alternatively be listed in tabular form for all elements. Characteristic sets of elements, such as transition metals, noble gases, and nonmetals, may also be specified. Users can search for elements by matching selection criteria (such as all metals having a covalent radius greater than 1.30Å); matching elements are highlighted when located. Scatter plots are constructed on an X/Y graph using any pair of numeric attributes, and if the atomic number is the X coordinate, points may be connected by lines. Graphs and tables may be saved as pictures, and easily accessed for display within the application. A disk cache may be used with Periodic Table Tool, and the size of the data file (table forms, attributes, sets) is limited only by the available space on disk. (Megamax C.)
**Current status**: Unknown.
**Contact**: James F. Johnson, Assistant to Chairman, Department of Chemistry, 247 Nieuwland Science Hall, University of Notre Dame, Notre Dame, IN 46556; (219) 239-5659

## Reaction Formatter

A desktop accessory that can be used with MacWrite, Reaction Formatter addresses the problem of formatting formulas in chemical reactions. As the chemical equations are entered, superscripting and subscripting are performed automatically and displayed immediately. Alternatively, this formatting may be completed manually. A preference box allows the user to change the point size of super/subscripts. Selected characters from the Symbol font are accessed using the mouse, and can be included in the reaction at the cursor location. The chemical information within Reaction Formatter's edit box, which includes a horizontal scroll bar, may be copied to the Clipboard. The Clipboard can accumulate several reactions, and may be displayed at any time. This collection of formatted chemical information can be pasted into a MacWrite document or saved as a separate document. (Megamax C.)
**Current status**: Unknown.
**Contact**: James F. Johnson, Assistant to Chairman, Department of Chemistry, 247 Nieuwland Science Hall, University of Notre Dame, Notre Dame, IN 46556; (219) 239-5659

# Chemistry

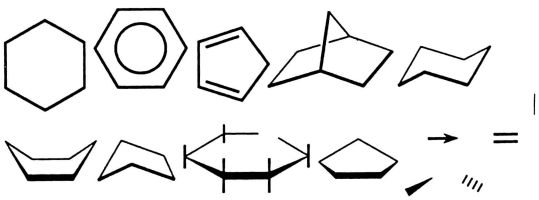
## Molecular Editor

A software-based construction kit for building molecules, crystals, or other structures that can be represented by interconnected points or spheres in three dimensions. You can build or edit structures of over 100 atoms from any element in the periodic table. Three-dimensional versions of Cut, Copy, and Paste allow you to build any molecule from an initial collection of basic structures and functional groups. You can also draw structures as all atoms and all bonds, atoms only, or bonds only; rescale the molecule, or independently rescale atomic radii while leaving bond lengths unchanged, allowing continuous variation from a touching-hard-sphere model to a bonds-only model; rotate a molecule through any angle about any of three orthogonal axes, either by single steps or continuously; and rotate or move a portion of a molecule with respect to another portion. Group theory operations such as inversion and reflection through planes are available. You can also measure the distance between any two atoms, the angle between any two bonds attached to the same atom, and the torsional angle about a bond; change the perspective, or viewing angle, from which the molecule is seen; store and retrieve structures on disk; and open up to 20 files at one time and flip the display manually between them. On a Macintosh 512K you can run through a sequence of open files rapidly (five frames/sec) using an animation feature. You can print the molecule in the active window (on an ImageWriter or LaserWriter printer) directly from Molecular Editor. There is an extensive Help Menu. Sample files of organics, functional groups, inorganics, crystals, simple geometric shapes, and a three-dimensional animation of a chemical reaction are included.
Current status: Version 1.0 completed. Public-domain demo disk available.
**Contact:** Coordinator, Microcomputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104

## Chemistry Network

The chemistry department at Wayne State University in Detroit has, over the last 12 months, installed an extensive AppleTalk network linking 24 Apple Macintosh Plus computers and 5 Apple LaserWriter Plus printers. The network was wired using 5 Apple custom wiring kits and is over 1,500 ft. in length.

**In the last issue of *Wheels*, which contained a detailed account of this chemistry department network, the examples of the Structure font were downloaded incorrectly. The actual Structure font examples follow. The phone number given for the campus contact was also incorrect. The correct number is listed below. The *Wheels'* staff regrets the error.**



Current status: Completed.
**Contact:** Dr. Louis Romano; (313) 577-2584.

# Computer Science

## Australian Computer Science Projects

Micro-Based Board for AppleTalk-to-UNIX ACSnet Link
**Contact**: Dr. Mike J. Rees, Information Science, University of Tasmania

Macintosh Electronic Blackboard
**Contact**: Dr. Mike J. Rees, Information Science, University of Tasmania

Digitizing Software for the Macintosh
**Contact**: Department of Information Science, University of Tasmania

MacShell—Sophisticated Terminal to UNIX
**Contact**: Steve Coy, Computer Science, University of Western Australia

MacProlog—Ported from PDP11 UNIX
**Contact**: Steve Coy, Computer Science, University of Western Australia

Compiler/Interpreter for Pascal-S
**Contact**: Neil Gray, Computing Science, University of Wollongong

Distributed Programming
**Contact**: Neil Gray, Computing Science, University of Wollongong

Small Laboratory Computer Simulation
**Contact**: Neil Gray, Computing Science, University of Wollongong

MacEngine—Cut-down Macintosh for use in such applications as sharing printers, print spooling, and providing a network gateway.
**Contacts**: Neil Gray and Gary Kelly, Computing Science, University of Wollongong.

**Current status**: All projects are continuing.

## An Assembly-Language Tool

The Supervisor provides an assembly-language environment in which the programmer can concentrate on programming with the 68000 assembly language, without worrying about input and output or even about the fact that the programming takes place on a Macintosh. (It was described in more detail in Issue #2 of *Wheels for the Mind* in March 1985.) To obtain the software, please send a request (on official academic stationery), a blank disk, and a self-addressed stamped envelope with sufficient return postage.
**Current status**: Completed.
**Contact**: Professor Jerry Keough, Department of Mathematics, Boston College, Chestnut Hill, MA 02167

## Rascal

Rascal is a new Pascal-based language-and-development system designed for the Macintosh, incorporating Editor, Linker, Compiler, and Execution Environment in a single application.
**Current status**: Completed. Commercially available for $129 (discounts for educational users), from Metaresearch, Inc., 1100 SE Woodward, Portland, OR 97202; (503) 232-1712
**Contact**: Scott Gillespie or Richard Crandall, Reed College, Portland, OR 97202; (503) 771-1112 ext. 277

## Assembler/Editor/Loader

This application was designed to allow efficient programming of Intel 8051/8031/8751 microcontrollers. Using the Macintosh window environment, this package provides instant visual access to all steps of program development. It is ideal for programming serially networked MCS-51-based devices or for high-speed data collection and appliance control via external lab computers.
**Current status**: Completed. Price: $150.
**Contact**: Richard Crandall, Reed College, Portland, OR 97202; (503) 771-1112 ext. 277

## Pascal Pointers

A tutorial-type package for teaching the use of dynamic variables and pointers in Pascal.
**Current status**: Available from ACE (Kinko's Academic Courseware Exchange, 800-235-6919; in California, 800-292-6640).
**Contact**: Coordinator, Microcomputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104

## LR1 Gen

A Parser/Generator. This program accepts an input grammar and generates Parse tables from the grammar. Options: LR, LALR, Strong Compatible LR, Weak Compatible. LR-Parse tables in human-readable and machine-readable forms.
**Current status**: In development.
**Contact:** Coordinator, Microcomputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104

# Computer Science

## UNIX-Based C-Development System

SUMacC is the Stanford/UNIX Macintosh C-development environment, a collection of programs that allows you to cross-develop Macintosh applications on your UNIX system and then download them to the Macintosh for execution. Requires VAX, Berkeley UNIX, or Eunice. A tape containing the SUMacC files is available for $65 plus shipping.
**Current status**: Version 2 completed.
**Contact**: Maria Code, Data Processing Services, 1371 Sydney Drive, Sunnyvale, CA 94087; (408) 735-8006

## Using the Macintosh in a First Computer Course

The Macintosh has been successfully used as the primary learning tool in a first computer course for about 400 students.
**Current status**: Completed and continuing.
**Contact**: James Gips, Computer Sciences, Boston College, Chestnut Hill, MA 02167

## MacGnome

MacGnome is a Macintosh environment for teaching beginning programming.
**Current status**: Beta test.
**Contact**: Rob Chandhok, Carnegie Mellon University, (412) 268-3452

## Project: Turing Machine

Philosophy Professors Jon Barwise and John Etchemendy have developed programs that are used to illustrate aspects of "computability." One program consists of a flowchart construction kit that enables the students to solve a particular problem by drawing a flowchart. The completed flowchart then drives a simulated Turing machine that executes the program. A second program, Tarski's World, allows the students to test the truth or falsity of statements about a block world that is displayed on the screen. The computer evaluates these statements, which are written by the student in predicate calculus, with respect to the state of the world.
**Current status:** Available from Kinko's Academic Courseware Exchange (ACE)
**Contact:** ACE, 800-235-6919, or in California, 800-292-6640

## MacProlog

An implementation of Prolog for the Macintosh ported from a PDP11 UNIX version. Version 1 is a straight port with a single, unsizable window. Version 2 will have multiple windows and control menus. Version 1 is available to Consortium members free of charge. Send us a disk.
**Current status**: V1 is completed. V2 status unknown.
**Contacts**: Casper A. Boon and Damian P. Meyer, Department of Computer Science, University of Western Australia, Stirling Highway, Nedlands 6009, Western Australia, Australia; (09) 380-2282

# Computer Science

## Binary Trees

Binary Trees is used in computer science courses to allow students to experiment interactively with the concept of binary trees.
**Current status**: Now in Version 2.1.
**Contact**: Kinko's Academic Courseware Exchange, 800-235-6919; in California, 800-292-6640

## Event Tutor

Event Tutor helps Macintosh programmers learn about "events" (see *Inside Macintosh*, "The Event Manager").
**Current status**: Version 1.1 available.
**Contact**: The Personal Computing Center, 1 McNutt Hall, Dartmouth College, Hanover, NH 03755

## Structure Charts for the Macintosh

We are developing a computer-aided design program on the Macintosh to assist with the preparation of structure charts in both business and computer science applications. The structure charts use the standard conventions presented in *The Practical Guide to Structured System Design* by Meilir Page-Jones. Easily modified, the charts will be especially convenient in a prototyping environment. The program, with automatic layout (while allowing the user liberal control), will create attractive laser-printer output, suitable for presentations or publication.
**Current status**: Unknown.
**Contact**: Andrew James Peterson, Student Programmer, Computing Center, University of Oregon, Eugene, OR 97403-1212; (503) 686-4394

## Pascal Programming Tools

The InForm program builds cross reference lists, formats sources, and extracts function/procedure declarations from Pascal sources. It supports Macintosh Pascal, TML Pascal, and Lisa Pascal.
InForm can be used to collect sources from several files.
**Current status**: Completed.
**Contact**: Available for $29 from G. Sawitzki, StatLab, Im Neuenheimer Feld 294, D 6900 Heidelberg, W. Germany; BITNET J40 @ DHDURZ2

# Computer Science

## Macintosh Use at the University of Chicago

The University of Chicago's Department of Computer Science is committed to the programming environment provided by the Macintosh, using it for a growing number of its undergraduate courses. The Department offers 10 sections of a two-quarter introductory programming course (CS 103-104) that uses Macintosh Pascal. Students without a substantial mathematics background often take this course in order to gain a fundamental understanding of programming concepts (top-down design, algorithms and problem solving, and so forth) without having to devote the considerable effort that's required to learn an editor, operating system, and Pascal compiler on a mainframe. The course has been very successful in attracting humanities and social science undergraduates who before were reluctant to deal with computers or overwhelmed by the prospect of working on larger machines. Macintosh Pascal allows the faculty to concentrate on the problem-solving and programming aspects of the course, rather than on how to deal with a mainframe operating environment. Also, the multiwindow environment of Macintosh Pascal facilitates the practice of testing and program debugging.

Another introductory course, Computer Programming as a Liberal Art (CS 110) also uses Macintosh Pascal on the Macintosh. This course is oriented especially toward humanities and liberal arts students. Its purpose is to teach students how to think about the meaning of programming techniques and technology reflectively, as well as to teach them to program.

In addition to this introductory programming sequence, the department is using the Macintosh implementation of the Scheme language (MacScheme, from Semantics MicroSystems of Beaverton, Oregon) in several of its more advanced courses, including CS 107 (an introduction to artificial intelligence and further programming principles), and CS 221 (programming languages). The department is also in the process of designing other introductory programming courses that will use MacScheme (a statically-scoped, LISPlike language) as the first computer language to be taught, rather than Pascal.

The department has a Macintosh laboratory for the use of its undergraduates. In addition to Macintosh systems, the lab provides access to hard disks and LaserWriter printers. Since the department is committed to UNIX and UNIX-based machines for its general-purpose computing and research (it operates a Pyramid 90X, VAX 750, AT&T 3B15, and ten Sun 3 workstations, all running UNIX variants), it is evaluating local area network file servers that can connect the laboratory Macintosh systems and LaserWriter printers (over an AppleTalk network) and can provide a gateway to the departmental (and campuswide) Ethernet system.

**Current status**: Completed.

**Contact**: Don Crabb, Director of Instruction and Laboratories, Department of Computer Science, University of Chicago, Ryerson Hall, 1100 E. 58th Stree, Chicago, IL 60637

# Design

## 3D Geometry

Mechanical engineering Professor Douglass Wilde's program allows manipulation of computer-generated pictures as part of instruction in three-dimensional computer-aided design. This CAD program helps design and engineering students visualize solid objects. The basic or orthogonal and isometric projections are built-in. Additional features include scaling, rotation, translation, and hidden-line removal.
Current status: Completed.
**Contact**: Mike Barlow or Karen Lee, IRIS, Cypress Hall, Stanford University, Stanford, CA 94305

## PADL 1—Computer-Aided Design

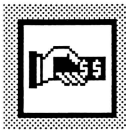
PADL 1 is a solid-modeling program currently running on VAX computers.
Current status: Unknown.
**Contact**: Rich Marisa, University of Rochester, 727 Elmwood Avenue, Rochester, NY 14620

## Perspective Drawing Recognition

The School of Design and Environmental Analysis is developing a teaching program for recognizing correct perspective drawing.
Current status: Unknown.
**Contact**: Kate MacGregor, Cornell University, Ithaca, NY

## Energy Diagraming

The University of Oregon's Department of Architecture has developed a program that enables students to design buildings that take advantage of the sun's heat and other thermodynamic principles. The software (which has three primary components) allows the designer to draw an intuitive design using a MacPaint/MacDraw-like environment while being free of the technical calculations necessary to determine the energy efficiency of the building. Using a data base of dimensions and calculations, the program provides room measurements based on factors such as climate, the amount of glass, and the location of the building in relation to sun exposure. It also gives the designer calculated feedback on whether or not the rooms and structures are energy efficient. The second part of the program contains lab exercises that the students can complete to learn principles such as wind and sun movement and heat transference. The third part of the program is a library of architectual examples that allow the user to examine, for instance, a building by Frank Loyd Wright. An additional feature of this library is its ability to select a part of the building and enlarge it for close-up analysis.
Current status: Completed.
**Contact**: G.Z. Brown, University of Oregon, Eugene, Department of Architecture, Eugene, OR 97403; (503) 686-5647



# Economics

### Problem Sets for Introductory Economics

Covers topics ranging from supply and demand to international trade. Students receive problem sheets for which the instructor assigns random values (within set parameters) for all variables. The instructor's disk generates variable-values answers for problems using these variables. Requires Multiplan.
**Current status**: Classroom testing.
**Contact**: Coordinator, Microcomputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104

### Problems in Macro- and Microeconomics

A five-disk set that includes microeconomics—introduction, cost functions, demand, competitive models, and wages (pure competition, imperfect competition, monopsony, and union), macroeconomics—money and banking, international exchange and trade, economic objectives, income determination, and fiscal policy, and an economic data base. Requires Multiplan and MacWrite.
**Current status**: Classroom testing.
**Contact**: Coordinator, Microcomputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104

# Education

### MacSED—Software-Evaluation Data Base for Macintosh

**Current status**: Unknown.
**Contact**: Prof. Michael Scriven, Education, University of Western Australia

### Mentor

This project will use Odesta Helix, and possibly other software, to provide a question-answering, CAL, and testing data base for teachers.
**Current status**: To be completed in November 1986.
**Contact**: Prof. Michael Scriven, Education, University of Western Australia, Stirling Highway, Nedlands 6009, Western Australia

### An Examination-Answering Program

This application is for use by first-year computer science students; it is part of an automatic examination-generation, answering, and marking system.
**Current status**: Completed.
**Contact**: Ranadeva Peries, Department of Computer Science, University of Western Australia, Stirling Highway, Nedlands 6009, Western Australia

# Education

## Child's Math Practice Games

**Current status**: Ongoing.
**Contact**: Dr. I. Robertson, Geology, Australian National University

## Multiple-Choice Test Scoring Program

**Current status**: Unknown.
**Contact**: Brian Anderson, RUUE, University of Western Australia

## Game Tests for Children

This application contains a series of very simple games, written such that the child does not get beaten as quickly as in other computer games.
**Current status**: Unknown.
**Contact**: Monique McGuire, Department of Computer Science, University of Western Australia, Stirling Highway, Nedlands 6009, Western Australia

## The Show and Tell Language

The Show and Tell Language (STL) is a new visual programming language designed for schoolchildren and novice computer users.
**Current status**: Beta tested in May; copy and user manual available for $10.
**Contact**: Don Kimura, Ph.D., Dept. of Computer Science, Washington University, 509 Bryan Hall, St. Louis, MO 63130; (314) 889-6122

## MatchMaker

This application is an authoring tool that enables the user to create matching exercises for drill and practice or testing. Any character that can be typed in MacWrite and then saved as text can be included in the application.
**Current status**: In testing.
**Contact**: Coordinator, Microcomputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104,

## Faculty Developer's Agreement

The University of Chicago Computation Center has released a standard "Developer's Agreement" for faculty, staff, and students that provides the official framework for technical and administrative support of Macintosh software development on campus for the nominal fee of $150 per year.
**Current status**: Completed.
**Contact:** Computation Center, University of Chicago, 5737 University Ave., Chicago, IL 60637; (312) 962-7151, BITNET @UCHICAGO.

# Education

## Computer-Aided Learning of Euclidean Geometry

**Current status**: Unknown.
**Contact**: A. Koerbin, Information Science, University of Tasmania

## Multiple-Choice Examination System

**Current Status**: Unknown.
**Contact**: Department of Information Science, University of Tasmania

## Interactive Teaching Package

**Current status**: Unknown.
**Contact**: Department of Information Science, University of Tasmania

## Faculty Handbook

A faculty handbook and disk of activities for first-year college composition classes. Published by D.C. Heath. See the News and Notes section of the winter 1986 *Wheels for the Mind* for more detailed information.
**Current status**: Completed.
**Contact**: Stephen Marcus, School of Education, University of California, Santa Barbara, CA 93106; (805) 961-4422

## TECA (Test Elaboration, Correction, and Analysis)

TECA's purpose is to facilitate the elaboration, correction, and analysis of objective tests or proofs. It has three parts:

1. Form Maker: Its input is an ASCII file that contains the test information, the codes that describe the type of each test question, and the text of the answers (the correct ones and the distractors). It allows the following types of questions: true/false, multiple choice, and elaboration.

2. Correcter: Its input is an ASCII file that contain's an identifier for each subject who has completed the test, along with that subject's answers (codes). Using stored information about these items, it corrects each test, giving the number of correct answers, errors, and omissions.

3. Statistical Analysis: TECA performs statistical analysis on the test results, offering a series of general statistics (frequency distribution, mean variance, standard deviation, skewness, kurtosis, and reliability by means of Cronbach's alpha method). In addition, it offers a series of statistics about the different items (percentages of correct answers, errors, and omissions; Garret's difficulty index; variance; standard deviation; and item-total correlation).

## TECA (Test Elaboration, Correction, and Analysis)

The following features are being considered as future enhancements:
- An editor to introduce the test items.
- An editor to introduce the subjects' answers to the tests.
- Output of the functions compatible with other statistical programs.
- Interchange of information with some data bases for storing the items and their statistics.

**Current status**: The first version was completed in spring 1986.
**Contacts**: Jaime Sanmartin and Juan Carlos Ruiz, Departament de Psicologia Experimental, Facultat de Psicologia, Universidad de Valencia, Avd. Blasco Ibanez 21, 46010 Valencia, Spain; (96) 369-4850

## Anatomiser

A graphic authoring tool for teaching anatomy or any other subject with graphic content. Available for downloading on Delphi (ICONtact) or CompuServe (MACUS).
**Current status**: Available through public domain.
**Contact**: Prof. Stephen Dubin, Dept. of Biomedical Engineering, Drexel University, Philadelphia, PA 19104

## PROSE (Prompted Revision of Student Essays)

PROSE is a Macintosh application package for increasing students' awareness of their own resources for rewriting and their skill at doing it. Designed to serve and shape the exchange of written work, comments, and revisions between the writing instructor and the writing student, PROSE enables instructors and students to work in the same medium of composition — a word processing program with facilities for entering and displaying instructors' comments, guiding students' revisions, and returning revised essays to instructors for review.

For further details about PROSE, see the related articles in the **Focus** and **Spotlight** sections.

**Current status**: Completed and ongoing.
**Contact**: Stuart Davis, Nancy Kaplan, or Joe Martin, Freshman Seminar Program, 159 Goldwin Smith Hall, Cornell University, Ithaca, NY 14853-2502; (607) 255-6349; BITNET: D2XY @ CORNELLA.

# Education

## Learning Tool

Based on work done at The University of Michigan, John Van Roekel and Professor Kozma have employed concepts of cognitive psychology to design an applications package intended to help college and high school students learn any subject matter. The Learning Tool is an "electronic notebook" that uses all of the Macintosh conventions to allow students to store and organize concepts and detailed course notes or other textual or graphic information. The package operates at three articulated levels. One level is an outliner that allows students to enter and organize key concepts. Each entry automatically creates a labeled "notecard" icon. At the second level, the icons for each notecard can be graphically organized and linked into a "concept map" that displays user-defined relationships (temporal, causal, associative, and so forth) among the concepts. The ability to create any number of submaps allows the user to develop complex relationships in compact networks. The creation and modification of these networks is intended to facilitate the learner's evolving understanding of relationships among concepts. In the third level, the students can enter detailed textual and graphic information for each concept. Students can do Boolean searches of their notes to facilitate retrieval of needed information, and can use multiple open notecard windows to maximize immediately available information.

Although this application has basic text and graphics tools, the Learning Tool can exchange information with more comprehensive packages to allow students to use their notes to write term papers or to paste complex graphics into their notecards. The package also allows students to create self-tests to assist in their studying of factual details and conceptual relationships. The package may also be useful to faculty members wanting to organize their lecture notes and to cognitive researchers interested in studying student learning.
**Current status**: Final version to be released in August 1986 for $50 a copy with bulk and site license discounts available.
**Contact**: Dr. Robert B. Kozma or John Van Roekel, Arborworks, Inc., 2540 Pittsfield Blvd., Ann Arbor, MI 48104; (313) 973-0628

# Education

## Future Vision

The Advanced Technology Learning Center (ATLC) at Texas Tech University was developed to help students learn and to help faculty improve their courses by using microcomputer technology. The 25,000-square-foot facility allows hands-on learning, experimentation, teaching, research, and curriculum and research development.

Housed in this facility is the Classroom 2000, a futuristic educational setting using Macintosh computers and LaserWriter printers. University professors can reserve the entire room for use by their classes for presentations. Other uses of this unique lab environment include training courses on specific software, and open access use for any university student or teacher.
**Current status**: Completed and ongoing.
**Contact**: Dr. Lee Alley, Assistant Vice President for Computing and Communications, Texas Tech University, Box 4120, Lubbock, TX 79409; (806) 742-1527

## Residence Halls

The University of Illinois has set up four clusters of 8 to 12 Macintosh computers in residence halls on the Champaign/Urbana campus. Twelve students have been trained by Claudia Wintergerst, the Apple marketing support representative, to use the Macintosh computers and several applications such as MacWrite and MacDraw. These first group of 12 students act as peer trainers to train other students in the residence halls to increase their productivity through microcomputing.
**Current status**: Ongoing.
**Contact**: Howard Diamond, (217) 333-1300, or Donna Price, Project Coordinator, (217) 333-0770

## Residence Halls

Northwestern University has set up the first Macintosh Lab in a residence hall on the campus of the residential College of Commerce and Industry, for business school students. With 15 Macintosh computers, 1 Macintosh XL, and several ImageWriter printers, the lab is heavily used by approximately 40 students per night. It was set up to provide more computer access for students and to provide another tool for their coursework. As a result of the success of the first lab, Northwestern is looking ahead at setting up other labs in residence halls across campus.
**Current status**: Ongoing.
**Contact**: Gene Shook, Student Coordinator, (312) 492-1998, or Don Collins, Provost and Project Manager, (312) 491-5255

# Education

## Residence Halls Computing

The University of Michigan's Computing Center's Information Technology Division and Housing Office have been involved in a team effort known as the Residence Halls Computing Project, or ResComp for short. It was started in September 1985 as a pilot project to computerize one residence hall and in January of 1986 was expanded to all residence halls.
**Current status**: Ongoing.
**Contact**: Ellen Hoffman, Computing Center (313) 936-2712, and Marvin Parnes, the Housing Office, (313)764-7408.

## College Administration

The Office of the Dean of Students in the College of the University of Chicago has proposed the computerization of its student advising and management information activities through the implementation of a network of Macintosh Plus workstations. The advisors need to quickly grasp and process vast amounts of information from diverse sources, including their own files and the Student Information System (SIS). Currently, 15 full-time academic advisors and other more specialized resource people are responsible for policy administration and advising students on courses, programs, and academic opportunities. In addition, they handle course registration, as well as resource coordination among Admissions, Financial Aid, the Registrar, Housing, Career Placement, Alumni, and Academic Divisions. Most of these activities are presently being handled through paper systems. The strategic goals for the project are to recover time for the college advisors and other support personnel; enhance the search for academic honors, awards, and aid; and improve communication and scheduling.

The general approach is incremental. We expect to implement the system function by function, with continuous testing of hardware, software, programs, and procedures by potential users. With this approach, we hope to reduce the risk of large, costly mistakes while constructing a solid foundation for full office automation. An essential aspect of the project is that it arises directly from the users themselves. By developing their own systems the advising staff will also be determining their own goals, needs, equipment, software, and training. The functions we have identified to date are as follows:

- Filing and sorting information
- Scheduling—for both students and administrators
- Communication—among advisors and with other offices
- Word Processing—for both internal and external distributions
- Budgets
- Analysis—of student information, and of workloads and effectiveness
- Registration—the major administrative function of the office

For each function, small pilot projects will develop prototype data bases and procedures with appropriate software (probably Helix) and hardware. These pilot projects will take place over the next two quarters as a first phase in the project. The results of the first phase will then be developed into a plan with a work schedule and budget for a second, full implementation phase. Macintosh Plus computers will form the core for each workstation, along with a hard drive

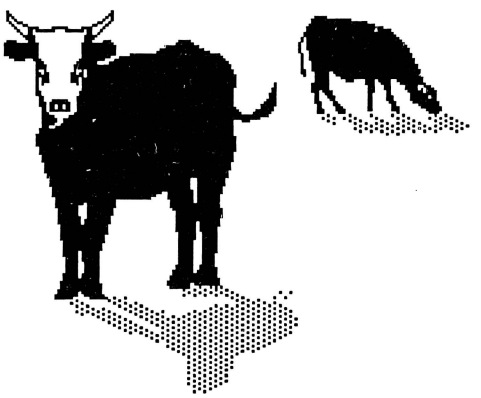
(possibly SCSI), and local ImageWriter II printers. An initial goal will be to develop access to a Microdata Sequel (PICK OS) data base through terminal emulation. This may evolve into Amdahl and DEC interfaces, possibly based on an Ethernet backbone or the University's IBX digital phone system. AppleTalk will be used for clustered printing and eventually for shared data base access to a minicomputer or possibly to an Apple-based file server.

As mentioned before, a major aspect of the implementation plans is that they are being developed largely by the system's prospective users, rather than by outside computer experts. The advisors are ardent generalists and proud computing novices. They are also experts in their own work. The extreme friendliness of the Macintosh interface, coupled with the business power represented by the Macintosh Plus, makes it especially appropriate for this project. The microcomputing innovations pioneered by the Macintosh have generated the radical idea that users can themselves build a system that fits their work, rather than accept a system for which they must adapt their work. This project will provide an interesting test of that idea.

This does not mean, however, that we don't want help from others. If anyone has already worked toward computerizing dean of students activities, please let us know of your work so that we can gain from your experience and share ours with you.

**Current status**: Completed.

**Contact**: B. Patrick Hall, Dean of Students Office, University of Chicago, Harper 233, 1116 E. 59th Street, Chicago, IL 60637; (312) 962-8622



# Engineering

## Earthquake Engineering

Reviews and defines basic principles of earthquake seismology through text and graphic displays. A short review of selected applications of seismology is included.
**Current status**: Classroom testing.
**Contact**: Coordinator, Microcomputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104

## TK!Solver for Problems in Materials Science and Engineering

Includes rapid crack propagation in plastic pipes, prediction of phase diagrams, determination of purity of materials, polymer flow and processing, and impact behavior of materials. All important behavior-of-materials properties (thermophysical, mechanical, electrical, chemical, and so on) are covered.
**Current status**: Classroom testing.
**Contact**: Coordinator, Microcomputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104

## SISO

An application for the study of linear dynamic systems and linear control theory. Includes simulations, designs, and graphic output. Systems are designed and analyzed in both time and frequency domains. Eigenvalues, eigenvectors, frequency response, and root locus.
**Current status**: Classroom testing.
**Contact**: Coordinator, Microcomputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104

## Transforms, Windows, Modulations

Follows the same user-interaction format and screen-design philosophy as the Signal Operations module for undergraduate courses in systems engineering. Performs discrete Fourier Transform of signals using the Fast Fourier Transform (FFT) algorithm and allows a variety of signal operations in both the time and frequency domains.
**Current status**: Available.
**Contact**: Coordinator, Microcomputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104

## Geotechnical Engineering

This package of nine separate programs handles traditional geotechnical engineering problems that are very calculation oriented. These programs are self-directed and titled as follows:

1. Settlement due to surcharge fill.
2. Settlement due to footing loads.
3. Interpretation of consolidation data.
4. Interpretation of triaxial data.
5. Slope stability by total stress analysis.

## Geotechnical Engineering

6. Slope stability by effective stress analysis.
7. Slope stability by using geosynthetics.
8. Bearing capacity of shadow foundations.
9. Bearing capacity of deep foundations.

**Current status**: Classroom testing.
**Contact**: Coordinator, Microcomputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104

## Structural Analysis

This software package contains 12 interactive programs for the analysis of determinate structures. Topics covered include equilibrium, determinacy, shear and moments for beaming and frames, truss analysis, and deformation of structural members. This software is designed as supplemental material for the first course in structural analysis.
**Current status**: Classroom testing.
**Contact**: Coordinator, Microcomputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104

## Simulation Design

Professor Jucker of the Department of Industrial Engineering has designed graphical exercises for analyzing random-number generators.
**Current status**: Completed.
**Contact**: Mike Barlow or Karen Lee, IRIS, Cypress Hall, Stanford University, Stanford, CA 94305

## Signal Operation

For use in introductory systems engineering courses, this module offers a variety of signal-generation options ranging from singularity functions, sinusoids, and exponentials to arbitrary functions. Versions 1.0 and 1.3.
**Current status**: Available.
**Contact**: Coordinator, Microcomputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104

## Deformation and Fracture of Materials

Professor Miller of Materials Science is developing a program to model deformation and fracturing of materials under a variety of conditions.
**Current status**: Completed.
**Contact**: Mike Barlow or Karen Lee, IRIS, Cypress Hall, Stanford University, Stanford, CA 94305

# Engineering

## Systems Analysis

An interactive, menu-driven software package that uses Microsoft BASIC. Can be used as an aid to solving problems involving matrix manipulations.
**Current status**: Completed.
**Contact**: Doug Starfield, (317) 494-6256

## Introduction to the Thermosciences

The Rankine and Brayton cycles are tutorials written for Engineering 32, "Introduction to the Thermosciences," by Professor Robert Eustis. They are used as the prime instructional medium for the topics, replacing lectures. Each lesson consists of two types of screen presentations: instructional frames and interactive frames. In the first type, content material is presented. In the second, the student attempts to solve a problem by generating graphs and data for different thermodynamic systems.
**Current status**: Completed.
**Contact**: Mike Barlow or Karen Lee, IRIS, Cypress Hall, Stanford University, Stanford, CA 94305

## Bode Analysis Program

This program provides a magnitude-and-phase plot for a linear system with a rational transfer function.
**Current status**: Completed.
**Contact**: T. J. Wagner, Department of Electrical and Computer Engineering, University of Texas, Austin, TX 78712

## Transmission-Line Simulation

This program shows voltages and currents on a transmission line with real source and load impedances. This type of input, the length of the line, the attenuation, and the value of the source and load impedance may all be selected.
**Current status**: Completed/ongoing.
**Contact**: C.H. Roth, Department of Electrical and Computer Engineering, University of Texas, Austin, TX 78712

## Wave Guide Lab

The Mac488 interface was used to interface a multimeter to the Macintosh. Microsoft BASIC was used to control the experiment and graphically display the data acquired.
**Current status**: Complete.
**Contact**: John Lefor, Electrical Engineering, University of Rochester, 727 Elmwood Avenue, Rochester, NY 14620

# Engineering

## Aerodynamics

This project is an attempt to demonstrate that most computer programs in the computational fluid dynamics area can be successfully implemented on a Macintosh with two 400K disks, 512K RAM, and hard-copy computer graphics capability.
**Current status**: Completed.
**Contact**: George Dulikravich, Penn State University

## Desktop Laboratory

This program incorporates Macintosh systems for initial use in the "Computer Applications in Chemical Engineering" course, and will form the nucleus of a considerably larger number of applications in other chemical engineering courses.
**Current status**: Completed.
**Contact**: Eugene Wissler, Chemical Engineering, College of Engineering, University of Texas, Austin, TX 78712

## Graphics Course

A revised curriculum for a junior-level computer graphics course in the electrical and computer engineering department will be designed to incorporate the unique graphics capabilities of the Macintosh.
**Current status**: Unknown.
**Contact**: Terry Wagner, Electrical Engineering, College of Engineering, University of Texas, Austin, TX 78712

## Macintosh Use in Engineering Instruction

The University of Iowa College of Engineering has standardized on Macintosh computers. Every faculty member has a Macintosh on his or her desk. One student lab houses 40 Macintosh computers and another identical lab is currently being set up. In total, there are more than 160 Macintosh computers in use, along with ImageWriter and LaserWriter printers. As part of a three-year curriculum and computer integration plan, the computers are being used in teaching programming and engineering courses, and for project work in every aspect of the engineering curriculum. More than 100 Macintosh computers are available for student use, either as stand-alone units or configured using MacApollo software (developed by the University of Michigan) as an interface to the Apollo minicomputer for computer-aided design (CAD) work.

In a major software development effort, faculty members are responsible for software development in their curriculum areas. Additional commercial software such as Macintosh Pascal and public-domain software developed at other universities has been adopted. Soon, each student will be expected to use the computer for a minimum of 10 hours per week.
**Current status**: Ongoing.
**Contact**: Dr. Jon Kuhl, Faculty Director, Iowa Computer Aided Engineering Network (ICAEN), University of Iowa, 2402 Engineering Building, Iowa City, IA 52242; (319) 353-7214

# Engineering

## Steamprop

Eliminates time spent by students in the interpolation of steam tables. By using this program, problems in the optimization of thermal systems that were previously too time consuming or required the use of mainframe computers may now be solved. Steamprop fixes thermodynamic states in both US and SI units and has a range from 32°F (0°C) to 1500°F (800°C) and up to 5000 psia (340 bars). Over this range it agrees with the 1984 NBS/NRS steam tables to better than 1 part in 200; in the subcritical range the agreement is better than 1 part in 200, making this program suitable not only for instrumental use but also for commercial applications.
**Current status**: Completed.
**Contact**: Coordinator, Microcomputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104

## Chemical Engineering

A program to model heat transfer in a human finger has been written in Microsoft BASIC (2.0 or 2.1) for a graduate course in Biomedical Engineering. The program considers the decrease in blood flow toward the end of the finger and also accounts for countercurrent transfer between arteries and veins. At the end of the finger, the series-parallel model of Mitchell and Myers (*Biophys. J.* 8:897, 1968) is used.
**Current Status**: Preliminary version finished, but further development ongoing.
**Contact**: Ken Solen, Chemical Engineering, 350-G CB, Brigham Young University, Provo, UT 84604; (801) 378-6237

## Chemical Engineering

A program in Microsoft BASIC (2.0 or 2.1) to model the clearance of barbiturate from the body using an artificial kidney. The program, written for a graduate course in biomedical engineering, considers the body in a four-compartment model with blood and tissue subcompartments in equilibrium as described by Dedrick and Bischoff (*Chem. Eng. Prog. Symp. Ser.* 64:32, 1968). Transfer equations are solved using a fourth-order Runga-Kutta algorithm.
**Current status**: Preliminary version finished, but further development ongoing.
**Contact**: Ken Solen, Chemical Engineering, 350-G CB, Brigham Young University, Provo; UT 84604, (801) 378-6237

## Chemical Engineering

A simple function-plotting program has been written in Microsoft BASIC (2.0 or 2.1) to plot any function provided in a subroutine. The program makes use of windows, buttons, and pull-down menus to allow easy selection of the plot features. The resulting plot can be reproduced on the ImageWriter with full-page resolution or can be transferred to other graphics programs (such as MacDraw) for further enhancement.
**Current status**: Essentially complete.
**Contact**: Ken Solen, Chemical Engineering, 350-G CB, Brigham Young University, Provo, UT 84604; (801) 378-6237

# Engineering

## Chemical Engineering

A curve-fitting program is being developed in Microsoft BASIC (2.0 or 2.1) to fit a set of x-y data to linear, quadratic, cubic, or exponential functions to a curve and plot the data and/or the fit. The program makes use of windows, buttons, and pull-down menus to allow easy selection of the plot features. The resulting plot can be reproduced on the ImageWriter with full-page resolution or can be transferred to other graphics programs (such as MacDraw) for further enhancement.
**Current status**: Essentially complete.
**Contact**: Ken Solen, Chemical Engineering, 350-G CB, Brigham Young University, Provo; UT 84604, (801) 378-6237

## Industrial Engineering

Professor Henry Riggs has designed Multiplan templates for use by students in an industrial accounting class. The students complete exercises on the principles of industrial accounting and then apply what they have learned to complete a major financial accounting exercises at the end of the course.
**Current status:** Completed.
**Contact:** Professor H. Riggs, Department of Industrial Engineering, Stanford University, Stanford, CA 94305

## Mechanical Engineering

During the last three semesters, mechanical engineering students have developed a user/tutorial package for the Macintosh (works best on 512K). The software, called MacHEATRAN, is very user-friendly and is designed for use in conjunction with any common heat-transfer textbook. The programs are menu driven and include the following 15 sections:

1. Introduction to conduction, convection, and radiation as covered in the first chapter of many texts.
2. Steady state conduction through composite walls. All three coordinate systems.
3. Fins—called "extended surfaces" in most texts.
4. Conduction shape factors for 24 shapes.
5. Convection heat transfer coefficient and friction in duct flow.
6. Convection heat transfer coefficients for flow across single tubes and tube bundles, including pressure drop across tube bundles.
7. Free convection, external, and enclosed flows.
8. Radiation configuration factor.
9. Flat plate heat transfer coefficient and boundary layer thickness for both free and forced convection and both laminar and turbulent flow.
10. Heat exchangers, using a combination of LMTD and the effectiveness-NTU method.
11. The electrical resistance network method (Oppenheim's) for solving radiation problems for net heat transfer between two, three, or four surfaces where the geometry and surface properties are known.
12. Lump capacity system analysis where up to six lumps represent the problem. Any of the lumps can be connected to a constant temperature source or a constant temperature sink, and a heat source can drive any or all of the lumps.

# Engineering

## Mechanical Engineering

13. Uniform heat generation for steady state in any of the three common coordinates.
14. A lumped capacity program set up to solve just the same type of problems solved by the Heisler charts; again, all three coordinate systems.
15. A linking portion of a program is set up so the user can add a favorite application program to the MacHEATRAN disk, called TRY YOUR SKILL.

Some fluid properties are included in the software and can be called automatically by the name of the fluid. The program is in Microsoft BASIC 2.0.

This software is designed for the beginning heat-transfer student or as a refresher for the rusty student. It is a tutorial disk, but is also appropriate for people who do an occasional heat-transfer estimate in their engineering work. Experts in heat transfer will probably find this program too simple.
With user's manual, the package is available for $95 and site licenses for $295.
**Current status**: Completed.
**Contact**: Richard Ulrich, Mechanical Engineering, 242-J CB, Brigham Young University, Provo, UT 84604; (801) 378-6542

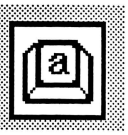
## Mac Controls

Mac Controls is an interactive educational and modeling program for engineers who are working with the design and control of systems. Mac Controls allows input of equations for a single closed-loop system in a domain, without any limitation as to the degree of polynomials in each transfer function. Menu choices permit plotting of phase or gain, using either logarithmic or linear interpolation for the range of desired frequency. Unlike comparable mainframe programs, Mac Controls is fast—5 seconds to plot! By *Wheels* press time, the program should also include an option to plot root locus for a system; addition of three-mode controller (PID); and output phase and gain margin. Mac Controls is written in FORTRAN.
**Current status**: Completed and ongoing.
**Contact**: Menachem Rafaelof, University of Utah Computer Center 3116 MEB SLC, UT 84112; (801) 581-6802

## MACVLSI

This program is for use in learning application-specific integrated circuits, and allows the student to do trial circuit layouts on the Macintosh. Completed designs are then downloaded to the VAX host computer for design-rule checking and circuit extraction. Student imagination can be put to work in the quick evaluation of alternatives in circuit layout.
**Current status**: Classroom testing.
**Contact**: Coordinator, Microcomputer Program, Office of Computing Sciences, Drexel University, Philadelphia, PA 19104

# Fonts



## Boston College Font Project

A number of finished and tested fonts, with more available all the time.
Current status: Completed and ongoing.
**Contact**: Prof. M. J. Connolly, Dept. of Slavic and Eastern Languages, Boston College/Carney 236, Chestnut Hill, MA 02167; (617) 552-3912

## Signifier

Signifier features a remapped keyboard that provides additional diacritic keys to support the needs of Greek and Cyrillic.
Current status; Completed. Cost is $15 to AUC schools. Send order to IRIS address. New version status unknown.
**Contact**: Norm Meyrowitz or Bernard Haan, IRIS, Box 1946, Brown University, Providence, RI 02912

## Bengali Font

Current status: Unknown.
**Contact**: Dr. H. Hossain, Department of Environmental Planning, University of Melbourne

## Einstein Fontech

This is a general-purpose math and science font that comes in six sizes (9, 10, 12, 18, 20, and 24 point) and is designed to be used with disk-based MacWrite.
Current status: Completed. For a disk with installed font and instructions, please send $18.
**Contact**: Sciensoft, P.O. Box 6311, Lubbock, TX 79413; (806) 794-2833

## Specialized Laser Fonts

A series of PostScript fonts—including Kadmos, Chemical Structure, Times and Helvetica Polish, and SmallCaps–for the LaserWriter printer is under development and will be distributed commercially (prices not yet set).
Current status: Unknown.
**Contact**: Allotype Typographics, 1600 Packard Road, Suite 5, Ann Arbor, MI 48104

## Keyfont

This project displays fonts stored in FFIL files or different systems.
Current status: Completed.
**Contact**: C.F. Miller, Department of Mathematics, University of Melbourne

# Fonts

## ANUMath Font

**Current status**: Completed.
**Contact**: Neville Smythe, Department of Mathematics, Australian National University

## Sanskrit and Thai Fonts (plus other Asian fonts)

**Current status**: Unknown.
**Contacts**: J. Radnell and P. Wesely-Smith, Department of Asian Studies, Australian National University

## Hupa Fonts

Hupa is a Hupa-language, Unifon-form character font for the Macintosh computer, available in seven point sizes: 9, 10, 12, and 14 points for documents, and 18 and 24 points for display or large-character documents. Designed by Marc Cogan (Department of Humanities), Wayne State University, with Ruth Bennett (Bilingual Emphasis Program), Humboldt State University
**Current status**: Completed.
**Contact**: Dr. Ruth Bennett, Director Bilingual Emphasis Program, Center for Community Development, Humboldt State University, Graves Annex (No. 30), Arcata, CA 95521

## Asian Fonts

Inspired by the work of Gerard Diffloth (Chicago) on a Khmer (Cambodian) font and George Hart (Berkeley) on various Indian fonts, and building on work Grant Olson (Cornell) did on a font for Thai, I have been creating a variety of fonts for Southeast Asian alphabets. Most of them are 18-point fonts numbered as if they were 12-point fonts, so the actual consonants on the line are consistent with other 12-point fonts, but with much more space above and below the line to allow for complex superscripts and subscripts. In all my fonts, superscripts and subscripts are typed on dead keys after the consonant above or below which they display and print. To date, I have working versions of fonts for Thai, Burmese, Shan, and Lao; and am well on the way to completing a font for Javanese. Eventually, I will get around to doing Cham, Mon, and Northern Thai, and unless someone else does them, Black Tai and Tai Lu...and Ahom? Asian Studies Bibliography—The Association for Asian Studies is in the process of computerizing the compilation and printing of the annual Bibliography of Asian Studies. Compilation is done by area specialists in Michigan, Maryland, and Connecticut, and the final editing is done at Yale. We are using Macintosh computers equipped with HyperDrive hard-disk drives, and the Apple LaserWriter. Software being used is Microsoft File and Word, and Aldus PageMaker. Richard Martin (Library, University of Virginia) is handling the hardware, and I am handling software.
**Current status**: Ongoing.
**Contact**: David Wyatt, Professor of Southeast Asian History, Cornell University, 415 Warren Road, Ithaca, NY 14850; (607) 257-1894 BITNET: T.RF4J@CRNL20A

# Fonts

## Greek Fonts

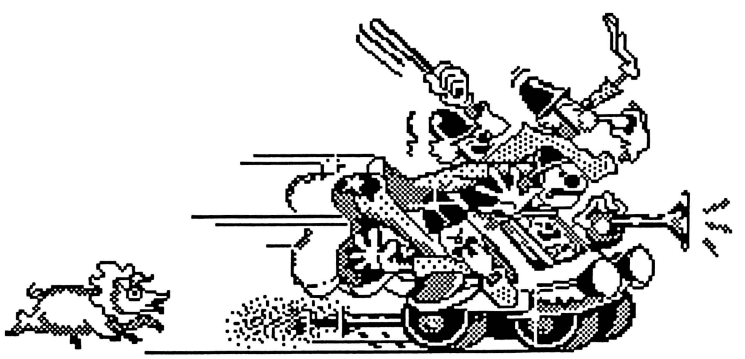
Alternate font development is also taking place on the University of Chicago campus. Perhaps the most complete Greek font package, SMK GreekKeys is commercially available for $25 in North America ($35 elsewhere). This package includes two different fonts in 9, 10, 12, 18, 20 and 24 points, a keyboard drive with 14 dead keys, and a MacTerminal document that displays both Greek and English; it can be used with an on-line Greek data base: the Thesaurus Linguae Grecae.
**Current status**: Completed.
**Contact**: SMK, 5760 S. Blackstone Avenue, Chicago, Ill. 60637, (312) 947-9157

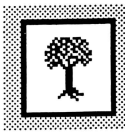
## Alternate Font Development

Also at the University of Chicago, scholars at the Oriental Institute, Argonne National Laboratory, and various other departments have created specialized fonts including: Khmer (with documentation, Prof. G. Diffloth, linguistics department), Arabic (12 point, with diacritics), Akkadian (with diacritics), Armenian, Bombay (12 and 24), Coptic (10 and 20), Cyrillic, Der (12 and 24), Demotic (20), Devanagari, Gaelic, Harmal (10), Hebrew (10), Latinica (10), Latvian (20), Moscow (12), Tamil, Vilne, Yerkes (9), and an astronomical/ scientific symbol font).
**Current status**: All listed fonts are completed.
**Contact**: William Sterner, Lead Staff Analyst, Information Technologies and New Services, Computation Center, University of Chicago, 1155 E. 60th Street, Chicago, IL 60637; (312) 962-7172, STAFF.BILL@UCHICAGO, A113

## A Font Workshop

The Font Workshop, a disk prepared for the University of Washington, tries to clear up much of the confusion about using the Font Editor, Font Mover, and related tools. For a free copy, send a disk.
**Current status**: Completed.
**Contact**: Walter Knapp, Route 4, Box 216B, Monroe, GA 30665; (404) 267-5198





# Geography

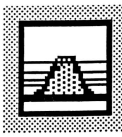
## Geographic Information System

A geographic information system (GIS) is a geo-referenced system for entering and managing data that is related to a place. Each piece of information is related to a grid location. A GIS differs slightly from a data management system because GIS is geo-referenced.

This software is being developed as an interactive program that will act as both a tutorial and a research program. The GIS program will be able to store, recall, map, combine, search, and update geographic files. In addition, the program will perform simulations. At present, only map data is accepted into the program; the ability to accept satellite data into the matrix will be incorporated later.
Current status: Development in progress.
**Contact**: Dr. John R. Giardino or Dr.Robert S. Bednarz, Department of Geography, Texas A & M, College Station, TX 77843-3115; (409) 845-3224

## Geographic Information Systems

Current status: Unknown.
**Contact**: Dr. I.D. Bishop, Department of Environmental Planning, University of Melbourne.



# Geology

## Magnetic Crystal Fractionation

Magnetic crystal fractionation processes will be modeled, using a program written in BASIC and the unique graphic capabilities of the Macintosh microcomputer. Input will include starting magma composition, composition and amounts of crystallizing minerals, and the number of crystallization steps. Output will include crystal cumulate and residual liquid compositions, and selected X/Y plots of particular chemical variables. The interactive character of the program will permit its use in class.
Current status: Program One ("XIFrac Trends") completed. Exchange or sale ($20 U.S., buyer's disk). Other programs under development include multiple-event crystal fractionation, fractionation trend comparison with known rock suites, and comparison of different graphical treatment of fractionation plots.
**Contact**: Dr. Douglas R. Mason, Department of Geology, University of Newcastle, Ranklin Drive, Shortland, N.S.W. 2308, Australia

# Geology

## Project: Plate Tectonics

This program, developed by Professor Michael McWilliams, performs the extensive calculations involved in plate tectonics and displays the results graphically. The students can view a plate "history," possibly using a "What if?" mode, or they can construct their own scenarios with novel geological and geophysical data as input.
**Durrent status:** In progress.
**Contact:** Professor M. McWilliams, Department of Geophysics, Stanford University, Stanford, CA 94305

## Geology Simulation

The main idea of this simulation program is to move a fluid element through a basin and to calculate the processes of transport, deposition, and erosion in dependence on the fluid velocity at a certain section of the basin. In addition, currents and the compaction of sediments can be simulated. There are a number of input parameters that control the system: initial fluid velocity, fluid volume, sediment input, grain-size distribution, physical properties of the sediment, and the initial basin configuration. The program is set up in modules and supports an extension to three dimensions. It offers a variety of possible experiments: simulation of growth faults, horst and graben structures, oscillating input parameters, randomly generated fluctuations of any input parameter, and more. The simulation also includes a number of sophisticated display programs. The simulated section can be displayed with its facies distribution, time lines, grain-size distribution, and layer display. Another graphics routine allows display of enlarged sections of particular parts of the simulated model. The program has been tested and it showed very realistic results, suggesting that this model can be used for sedimentation simulations.
**Current status:** Completed.
**Contact:** Klaus Bitzer, Geologisches Landesamt, Albertstr.25, 78 Freiburg, West Germany

## Groundwater Hydrology

Reviews and defines basic principles of groundwater hydrology and geology (including steady-rate well hydraulics).
**Current status:** In development.
**Contact:** Coordinator, Microcomputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104

## Structural Geology

Uses basic properties of igneous rocks (mineralogy, color, texture, and so on), metamorphoric rocks (mineralogy, texture) and sedimentary rocks (mineralogy, grain size, fossils) to assist in the indentification of common rocks. Properties determined in the laboratory service as input. Reviews basic principles of structural geology and applies those principles to the interpretation of geological maps.
**Current status**: Classroom testing.
**Contact**: Coordinator, Microcomputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104

# History and Politics

- Treaty of Versailles

A series of exercises to teach the major territorial and reparation decisions in the Treaty of Versailles. Uses questioning and interactive map exercises.
**Current status**: Available from Kinko's Academic Courseware Exchange (ACE); 800-235-6919, or in California 800-292-6640.
**Contact**: Coordinator, Microcomputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104.

- Historical Simulation: The Would-be Gentleman

A sophisticated simulation of economic and social life in 17th-century France, which casts the student as a nobleman. The aim is to maximize wealth and prestige over the two generations of the simulation.
**Current status**: Available from Kinko's Academic Courseware Exchange (ACE).
**Contact**: ACE, 800-235-6919; in California, 800-292-6640

# Humanities

- Tools for Writers

A text-analysis program that flags all uses of "to be" and occurrences of anomalous or incorrect words and phrases within a customized dictionary, among other things.
**Current status:** Available from Kinko's Academic Courseware Exchange (ACE).
**Contact**: ACE, 800-235-6919; in California, 800-292-6640

- BRS Simulator

Software that simulates the search environment of BRS, a commercial data-base vendor. It is used to introduce freshmen to data-base concepts and search strategies before going on-line.
**Current status:** Available from Kinko's Academic Courseware Exchange (ACE); 800-235-6919; in California, 800-292-6640
**Contact**: Coordinator, Microcomputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104

## Create

A prewriting program designed to stimulate ideas about the direction a document should take to achieve its purpose. It is useful when students have chosen a topic but have not yet narrowed their focus.
**Current status**: Available through Kinko's Academic Courseware Exchange (ACE); 800-235-6919 or in California, 800-292-6640 .
**Contact**: Coordinator, Microcomputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104

## Macintoshes in the Writing Program

Microcomputers are finding a place in the "Programs in Writing" at the University of Chicago. In the fall, the Programs will institute a pilot project based on a cluster of 20 microcomputers chiefly intended for the use of first-year students in the Humanities Common Core. Approximately a hundred students will be taught to use MacWrite, and will be expected to produce all of their essays for the Humanities Core on the cluster's machines. These students will be assisted by specially trained writing interns.

The purpose of the first year of the project is to determine whether word processing can make a substantial difference—beyond mere convenience—in how students learn to write. The students involved in the project will be given the kinds of instruction, assignments, and revision exercises that only word processing makes practical. Students selected for the project will be distributed randomly throughout the core, with the exception that one section of the core will have all 20 of its students involved.

The next step will be to develop ways to take advantage of the full power of the project's micros. The task for the second (and perhaps third) year will be to develop two kinds of software. The first is an integrated word-processing package that includes prewriting and editing utilities. Though such utilities are common enough, those now available have three major disadvantages: First, the utilities do not come as integrated packages; second, they are not based on adequate models of text structure and construction, failing to incorporate the vocabulary and analytical procedures widely shared by all the writing programs at the university; and third, they do too much of the students' work (a successful pedagogical utility is not one that tells students what to do to improve their work but one that leads students to do that work for themselves). The second kind of software we hope to find or develop is a communications package that makes two computers act as one, so that a student and an instructor can edit a text together. Beyond the third year of the project, the chief task will be to integrate the microcomputers that the students use with the UNIX-based minicomputer that will house the Programs' data bases of examples of student writing, exercises based on the student examples, exercises in basic grammar, and discipline-specific teaching handouts for students of varying skills.
**Current status**: Ongoing.
**Contact**: Greg Colomb, University of Chicago, Programs in Writing, 5811 S. Ellis Ave., Chicago, IL 60637

# Humanities

## Cave-Painting Data Base

In the 1960s, Indian cave paintings dating back to 8,000 B.C. were found in Texas. A typical approach to researching this art has rock art specialists sitting in caves observing the complex symbols to determine their meaning. At Rice University, the Department of Anthropology is using the Macintosh computer to create a data base of the paintings' attributes, details on the physical remains such as cactus cud and feathers, and locational information such as the paintings' distance from water and from the cave entrance. In addition to providing statistical analysis of the findings, photographs of the artwork are digitized and displayed on the Macintosh screen for closer inspection.

Future plans call for the computer to act as an artificial intelligence interface to provide pattern recognition. This means the computer will analyze the lines and offer an interpretation of the picture's subject. This project was exhibited from the end of January through the beginning of March at the campus museum. The exhibit included a Macintosh that offered viewers hands-on access to the data base. In November the exhibit, including approximately 10 Macintosh computers, will move to Witte Museum in San Antonio, Texas.
**Current status**: Completed and ongoing.
**Contact**: Dr. Rod McIntosh or Patty Bass, Department of Anthropology, Rice University, 6100 Main Street, Houston, TX 77251; (713) 527-4003 or (713) 432-7892

## Computer Writing Lab

Instructors at the University of Hartford are teaching journalism and writing in two unique computer lab settings. The College of Arts and Sciences has two networked classrooms complete with ImageWriter and LaserWriter printers. In one of the classrooms, students learn journalism skills using 24 Macintosh computers linked to a hard disk. In the other classroom, English professors provide hands-on intensive language instruction to 10 to 12 students using Macintosh computers linked to a hard disk. Faculty members use an additional 14 Macintosh computers. Instructors use the Macintosh and hard disk to give the students assignments. Then, with a click of the mouse, students call the assignment up on the screen, complete it, and save it under a new file name. The instructor checks the work by opening up the student's file from the hard disk. This has been particularly useful for learning editing techniques. The instructor leaves the text to be edited and the student saves the completed assignment on the hard disk. Compositions are also graded on disk.
**Current status**: Ongoing.
**Contact**: Dr. Jeff Minter, College of Arts and Sciences, University of Hartford, 200 Bloomfield Avenue, West Hartford, CT 06117; (203) 243-4133

## Techwrite

Techwrite is a text-analysis tool designed specifically for use in technical, scientific, and social science writing. It will provide organizational aids, including templates customized for various writing tasks. It will provide editing aids, with emphasis on problems commonly encountered in technical and scientific writing, including establishment of abbreviations, avoidance of

numbers or abbreviations as first words of sentences, and consistent reference to tables and figures. A key feature of this application is its ease of use; all of its programs are designed as desk accessories. For the Techwrite user, the program will not intrude much on the actual writing activity, and it will provide meaningful feedback in areas that are extremely important to a specialized kind of writing.

## Techwrite

**Current status**: Under development; first testing, spring 1986.
**Contact**: Muriel Zimmerman, Interdisciplinary Writing Program, Department of English, University of California, Santa Barbara, CA 93106; (805) 961-2462

This project explores the feasibility of using the Macintosh in a writing laboratory environment.

## Writing Lab

**Current status**: Completed.
**Contact**: Jerome Bump, College of Liberal Arts, University of Texas at Austin, Austin, TX 78712

Goal Statement: The goal of this course is to combine the techniques of computer programming with liberal arts modes of thinking about the human meaning and social applications of computers.

## Computer Programming as a Liberal Art

Course Description: The course will approach computer programming both as a specialized set of techniques tied to a particular subject matter, and as a set of interdisciplinary arts adaptable to a wide range of problems. Thus, students will learn how to write programs in Pascal on Apple Macintosh computers, while at the same time learning how to reflect upon the activity of programming in more open-ended terms. Course assignments will include programming problems, several short quizzes, a midterm exam, and a paper. The course will be taught by William Sterner of the computation center and Don Crabb of computer science.

In specific, the course will present traditional techniques of problem solving, algorithm choice, program coding, and debugging through lectures and programming assignments—as does any introductory course. In addition, the course will examine these techniques as interdisciplinary arts of "recovery," "invention," "presentation," and "systematization."

Such arts acquired in the context of programming can then be generalized and adapted to other subjects. This additional part of the course will be approached through assigned readings, class discussion, and a "reflective" paper on the human meaning and social implications of computer programming.

Because of this wider context, the students must also learn to recognize those situations where even liberal programming arts are not adaptable to some problems. If such situations were assimilated to a "programming" approach,

# Humanities

## Computer Programming as a Liberal Art

they might present potential dangers for society and might waste technological resources.

Prerequisites: Since the challenge of this course will lie in doing a lot of clear thinking in a humanistic mode, the student should have at least a rough sense of humanistic reflection. Previous coursework in the common core or philosophy would prove valuable. No prior programming experience will be assumed, and no mathematics beyond high school will be required.

Intended Students: This course is intended especially for liberal arts students who want to explore the meaning of computer technology, and for beginning computer science students who want to understand the broader significances of their discipline from the outset. Students with extensive programming or mathematical background should not register for this course.
**Current status**: New course offered summer 1986.
**Contact**: William Sterner, Lead Staff Analyst, University of Chicago Computation Center, 1155 E. 60th Street, Chicago, IL 60637; (312) 962-7172; STAFF.BILL@UCHICAGO, A113

## Automated Language Processing

Selected faculty at Michigan State University are using Macintosh personal computers with MacProof from Automated Language Processing Systems (ALPS) to help teach English composition.

There are five designated campus sites including the English department, American thought and language department (the freshman writing program), the Learning Resource Center, and the library. Students composing papers in one of MSU's Macintosh/ALPS labs have their writing automatically diagnosed problems with grammar and syntax, puncuation, spelling, even racist and sexist language. More than 1,000 students are expected to benefit from MacProof each semester.

The project, designed to enhance the creative writing process, demonstrates the impact that computers have on the creative processes, specifically on writing skills. Results of this impact will be surveyed, and the project will be expanded to include additional students and other departments on campus.
**Current status**: Completed.
**Contact**: Dr. Peter Lyman, Assistant Director of Academic Computing, 315B Computer Center, Michigan State University, East Lansing, MI 48824; (517) 353-0722

# Languages

## Macedonian-English Dictionary

Current status: Unknown.
**Contact:** Prof. R. De Bray, Department of Slavonic Languages, Australian National University

## Hypertext/Hypermedia

The Institute for Research in Information and Scholarship has undertaken a long-term research project to design and develop a hypertext-hypermedia system. The research is being conducted within the context of Brown's Scholar's Workstation Project—a decade-long effort directed at creating a campuswide network of high-powered, graphics-based workstations for use in research and teaching in the sciences and liberal arts.
Current status: A long-term, ongoing project. An initial hypertext/hypermedia prototype allows users to create links to interactive videodisc frames as well as text.
**Contact:** Norm Meyrowitz, IRIS Scholar's Workstation Group Manager, Brown University, Providence, RI

## Drill, an English-Language Drill Program

Drill can be used in almost any course where text- and/or picture-based drilling is useful. The disk includes Drill, (the program), Create a Drill (a script about writing drills), documentation, and sample drills.
Current status: Available from Kinko's Academic Courseware Exchange (ACE).
**Contact:** ACE, 800-235-6919; in California, 800-292-6640

## Language Teaching Using a "Bitworld"

Students learning Russian use a program developed by Professor Van Campen that associates vocabulary items with graphic representations of objects. If an object is selected, the corresponding vocabulary item is displayed (either alone, as part of a paradigm, or in a sentence). Some objects, such as cupboards, can be 'opened' to reveal their contents, thereby giving access to a new set of objects.
Current status: In progress.
**Contact:** Mike Barlow, IRIS, Cypress Hall, Stanford University, Stanford, CA 94305

## The Glossarizer

The Glossarizer consists of a simple editor for entering text and a "glossary mode" for attaching notes, translations, or other explanatory information to a word or phrase in the original. It was designed as a tool for foreign-language teaching.
Current status: Completed.
**Contact:** Katy McKinin, Rice University, ICSA, Box 1892, Houston, Texas; (713) 527-4986

# Languages

## Spanish Language

The purpose of this program is to develop software programs designed to help bilingual-education students improve their written language skills in Spanish; to provide students with hardware and Spanish-language software in a laboratory setting; to gather data on the effectiveness of this type of computer-assisted instruction; to revise the software accordingly; and to use the software for in-service training of current bilingual-education teachers.
**Current status**: Unknown.
**Contact**: George Blanco, Curriculum and Instruction, College of Education, University of Texas at Austin, Austin, TX 78712

## Demotic Dictionary

Dr. Jan Johnson of the University of Chicago Oriental Institute is using the Macintosh to produce a dictionary of the Demotic language. The dictionary staff has already compiled about 6 megabytes of material to be stored on a hard disk for easy access and analysis. Dr. Johnson plans to print the dictionary as a supplement to Erichsen's Demotisches Glossar on the LaserWriter, if the required fonts can be created for the device. If not, the dictionary will be printed on an ImageWriter and then offset.
**Current status**: Ongoing.
**Contact**: Jan Johnson, Director, Oriental Institute, 1155 E. 58th Street, Chicago, IL 60637

## MacLang

MacLang is an authoring system that allows language teachers inexperienced in computer use to write computer-assisted language learning (CALL) exercises on a Macintosh 128K microcomputer. With the MacLang authoring system, teachers can create software specifically tailored to their curriculum and to the needs of their students, rather than being obliged to teach new grammar and vocabulary so that students can use prepackaged commercial software.

In its current version, MacLang offers the possibility of preparing five types of exercises using English and any one of the following languages: French, Spanish, Italian, Portugese, German, Rumanian, or Russian. The five types of exercises are as follows:

1. Vocabulary-equivalency drills in which students must give the target-language equivalent of the English word presented on the screen.
2. Vocabulary-definition drills in which students must type the target-language word that fits the definition presented on the screen in either English or the target language.
3. Fill-in-the-blank exercises in either English or the target language, based on both grammar points and vocabulary.
4. Question-and-answer exercises, in which the student user types a complete answer in response to a question asked by the computer.
5. Multiple-choice questions of any type.

MacLang

Options available in the authoring system assure that MacLang exercises provide students with the immediate feedback, error correction, individual learning experience, and reinforcement that are the main advantages of computer-assisted learning over traditional workbook exercises. First, before each exercise, teachers can write an introduction, in which they can include any information they wish, writing only brief instructions or transforming the introduction into a tutorial by providing a succinct review of a grammar point or a vocabulary topic. Second, MacLang exercises can accept more than one right answer, and can display appropriate and informative error messages for all incorrect answers that teachers can anticipate. For example, if a student responds using the wrong tense, the error message flashed on the screen can explain why that tense is incorrect and provide the student with a hint for his or her next try. In addition, since the program stores wrong answers made by students while they are doing exercises, teachers can continually add to the stock of wrong answers—eventually creating a completely interactive exercise in which virtually all wrong answers are anticipated. Finally, MacLang lets teachers decide how many tries students should have to get a right answer. In this way, given the anticipated error feature just mentioned, students can be led to discover the right answer in nearly all cases.

More than one exercise can be stored on a single disk, allowing students to choose from a menu those that they would like to do. The format of the exercises is simple, and students do not need special training to be able to do them. MacLang automatically creates exercises that can be interrupted at any point, so that students can stop computer activity when they wish, avoiding the locked-in feeling associated with much CALL (Computer-Aided Language Learning) software. The program can be used at any level of proficiency in the target language, since the teacher using the authoring system determines the excercises' degree of difficulty.

Current MacLang development involves the creation of a 512K version, which should be ready in the fall of 1986. This version, usable with more languages (definitely Greek, and possibly Arabic and Hebrew) will have several new features. The new MacLang will allow the Macintosh to be interfaced with a Tandberg tape recorder or with a videodisc player. There will also be a score-keeping option for both students and teachers and a help function for student users. Additional formats, such as cloze passages and rearrangement and expansion exercises, will make MacLang more adaptable for teachers and more interesting for students.

Current status: Ongoing.

**Contact:** Judith Frommer, Department of Romance Languages and Literatures, Boylston 227, Harvard University, Cambridge, MA 02138

# Languages

## Russian Verbal Aspect Drill

A program to drill students in selecting the correct verbal aspect, person, tense, and mood to insert in Russian sentences. Currently there are 78 sentences to drill with. The drill sentences are categorized according to specific verbs (such as "to decide"), a type of verb (such as unprefixed verbs of motion), or mixed verbs. Students may call for a translation of the Russian target sentence at any time. Incorrect answers may be retried as many or as few times as the student desires. A help screen containing a synopsis of the basic rules governing aspectual usage is always available.
**Current status**: Preliminary version in Microsoft BASIC is working and available. Runtime and Pascal versions under development.
**Contact**: Martha P. Rice, Professor of Russian, Coordinator of Humanities Computing Development, University of Tennessee, Knoxville, TN 37996

# Management

## Data-Base Management Using Pascal Interpreter

**Current status**: Unknown.
**Contact**: W. Naughton and D. Whaiter, Department of Economics and History, Australian National University

## Prototyping of Iconic Interface for Accounting Packages

**Current status**: Preliminary.
**Contact**: J. Radnell and P. Wesely-Smith, Department of Commerce, Australian National University

## HRPS

The conversion of Human Resource Planning Simulation (HRPS) from the Prime system to the Macintosh. HRPS is a classroom aid.
**Current status**: Classroom testing.
**Contact**: Coordinator, Microcomputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104

## ALPAL

Performs linear programming in two alternate modes: simplex and graphical.
**Current status**: Available through Kinko's Academic Courseware Exchange; 800-235-6919, or in California, 800-292-6640.
**Contact**: Coordinator, Microcomputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104

# Management

## Business Law Case Studies

This application includes summaries of selected cases in business law, each followed by a legal question based on that case.
Current status: Classroom testing.
**Contact:** Coordinator, Microcomputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104

## Stat Helper 1

Unlike statistical-processing packages, Stat Helper I was specifically developed as a teaching tool. This software is intended for use in the first term of a two-term undergraduate statistics course. Written for the Apple Macintosh computer, this package allows the student to solve problems involving probability, expectations, discrete and continuous distributions, sample-size calculations, and confidence intervals. The answers to discrete and continuous probability distribution problems and to confidence-interval problems are illustrated using the powerful graphics of the Macintosh.

The software features a decision-tree approach, which allows the user to develop skills in problem recognition. The instructor's version allows the creation of sample problems along with the correct sequence of responses in the decision tree. By responding to incorrect choices with corrective comments, the decision tree reinforces the correct problem parsing. The package can also be used as a computational tool in statistical problem solving.
Current status: Classroom testing.
**Contact:** Coordinator, Microcomputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104

## Stat Helper 2

This software package continues where Stat Helper 1 leaves off. It was developed as a teaching tool, not a statistical-processing package, and is intended for use in the second term of a two-term undergraduate statistics course. The package permits the solution of hypothesis-testing problems, sample-size calculations, and simple regression and ANOVA problems. This software also features the decision-tree format introduced in Stat Helper 1, reinforcing the development of students' problem-recognition skills. Stat Helper 2 uses a unique puzzle-solving approach, which focuses not on the calculations but on learning the interrelationships of the many statistics that arise in regression and ANOVA analysis. Macintosh graphics capabilities are also an integral part of many solutions.
Current status: Classroom testing.
**Contact:** Coordinator, Microcomputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104

# Management

## Linear Programming with LINDO on the Macintosh

Linear programming has found wide use in industry for solving problems in production scheduling, distribution, product mix, financial planning, and product blending.

The well-known LINDO program for linear, integer, and quadratic programming is now available on the Macintosh 512K. For users familiar with LINDO on other machines, it is a full implementation. For example, it has integer, quadratic, and parametric programming, as well as simple upper and lower bounds, row names, MPS file-format interface, and the peruse commands CPRI and RPRI.

LINDO has over 50 commands for data input, editing, optimization, display, logical data inquiry, file handling, and sensitivity analysis. Problems are quickly and easily entered from the keyboard in standard mathematical notation or imported from text files created by other programs, such as text editors.

The mathematical problem that LINDO addresses is that of maximizing a linear function subject to satisfying a set of simultaneous linear equations and inequalities, with some of the variables restricted to being integer.
**Current status**: Running and available. Development continuing.
**Contact**: Linus Schrage, Graduate School of Business, 1101 E. 58th Street, University of Chicago, Chicago, IL 60637; (312) 962-7449

## Actuarial Models

This project provides Macintosh systems to the actuarial science and risk management and insurance faculty for the development of a pool of actuarial models used in their research and teaching, using Multiplan and TK!Solver.
**Current status**: Unknown.
**Contact**: Samuel Cox, Finance, College of Business Administration, University of Texas at Austin, Austin, TX 78719

## Travel Agents Management System

**Current status**: Ongoing.
**Contact**: Steve Coy, Computer Science, University of Western Australia

## Plant Maintenance Scheduling

**Current status**: Ongoing.
**Contact**: Steve Coy, Computer Science, University of Western Australia

## CPM (Critical path)

**Current status**: Ongoing.
**Contact**: Steve Coy, Computer Science, University of Western Australia

# Management

## Managerial Economics

Basic statistics programs for use in managerial economics, which include simple regression, multiple regression, nonlinear regression, decomposition analysis, smoothing, and Monte Carlo simulation.
**Current status**: Completed.
**Contact**: Prof. Barry Keating, College of Business Administration, 135 Hayes Healy Center, University of Notre Dame, Notre Dame, IN; (219) 239-5057; BITNET: FL6BCP@IRISHMVS

# Math and Statistics

## The Data Desk

The Data Desk is a highly interactive statistics package with capabilities that include data entry and editing, univariate summary statistics, tests and confidence intervals, correlation, simple and multiple regression (including diagnostic statistics), one- and two-way ANOVA, contingency tables and chi-square, scatterplots, histograms and boxplots, ranking, sorting, generation of random samples from a variety of distributions, transformations specified as general algebraic equations, and generation of patterned data.
**Current status**: The Data Desk has been used in teaching large classes at several universities. A student version, including the program, handbook, and data sets, is available for a suggested list price of $35. This version is fully functional but limits data set size. It is available in quantities of 10 or more, and requires only a Macintosh 128K with one disk drive. The professional version is available for $125 and requires a Macintosh 512K. It has no restrictions on data file size other than disk space.
**Contact**: Paul F. Velleman, Box 4555, Ithaca, NY 14852; (607) 256-4411

## Multiple Regression Template

This Macintosh Multiplan template is configured for data sets with three or fewer independent variables, and performs least-squares multiple regression.
**Current status**: Completed.
**Contact**: David Ellerman, Computer Sciences, Boston College, Chestnut Hill, MA 02167

## Regression-Sampling Program

Reg Sampler is a regression-sampling program that allows graphic depiction of the variation in regression-coefficient estimates that can occur in repeated samples for a given set of explanatory "X" data, or independent variables.
**Current status**: Completed.
**Contact**: David Belsley, Department of Economics, Boston College, Chestnut Hill, MA 02167

# Math and Statistics

## Conformal Mapping Program

Developed by: Rice Macintosh Software
Concept: Sam Davis, Chemical Engineering
A graphically oriented program that displays the effects of mappings of the complex plane on contours, computes complex-value functions, and allows student specification of the contours and the mappings.
**Current status**: Completed.
**Contact**: Andrea Martin, ICSA, Rice University, Houston, TX 77251; (713) 527-4965

## Calculus Teaching Package Including a Graphic Tool

**Current status**: Unknown.
**Contact**: Neville Smythe, Department of Mathematics, Australian National University

## Converting MASS STATS Packages from Z8086 to Macintosh

**Current status**: Unknown.
**Contact**: Anna Ferrante, Department of Mathematics, University of Western Australia

## Plotting Derivatives of a Calculus Function

Developed by: Rice Macintosh Software
Concept: Paul Pfeiffer, Mathematical Sciences
This program allows you to define a function with up to seven coefficients, plot the function, and calculate its derivative.
**Current status**: Completed.
**Contact**: Andrea Martin, ICSA, Rice University, Houston, TX 77251; (713) 527-4965

## Linear Programming Template

This application is a Multiplan template that uses the simplex method to obtain a solution to linear programming problems.
**Current status**: Completed.
**Contact**: David Ellerman, Computer Sciences, Boston College, Chestnut Hill, MA 02167

## Mathematics Laboratory

A package for computer-based instruction of calculus developed for the IBM PC is being ported to the Macintosh.
**Current status**: Expected to be completed by October.
**Contact**: Craig McGowan, Computer Center, University of Rochester, 727 Elmwood Avenue, Rochester, NY 14620

# Math and Statistics

## Functions

The purpose of this project is to develop tools for a graphical study of mathematical functions, suitable for both calculus and precalculus work.
**Current status**: Unknown.
**Contact**: Eugene A. Klotz, Swarthmore College, Department of Mathematics, Swarthmore, PA 19081; (215) 447-7243

## Calculus Demos

Designed for lecture/classroom demonstrations of related rates, area under a curve, volumes of solids of revolution, rotation of axes, parametric equations, and polar coordinates.
**Current status**: Classroom testing.
**Contact**: Coordinator, Microcomputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104

## Matrix Algebra

A program that uses rational arithmetic for solving the following problems: transforming a matrix (up to 6 x 12) to reduced row echelon form, solving a linear system (up to six equations in 11 unknowns), multiplying two matrices (each up to 6 x 12), and finding the inverse of a matrix (up to 6 x 6). Has tutorial and automatic modes of operation.
**Current status**: Available through Kinko's Academic Courseware Exchange; 800-235-6919, or in California, 800-292-6640.
**Contact**: Coordinator, Microcomputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104

## Math Programs

Dr. Snow has created a number of short graphing and calculating programs in Microsoft BASIC.
**Current status**: Complete and ongoing.
**Contact**: Dr. Dennis M. Snow, Department of Mathematics, 203 Computing Center and Math Bldg., University of Notre Dame, Notre Dame, IN; (219) 239-6227

## Linear Programming

MacSimplex is designed for teaching how linear programming problems are solved. It is also useful for other topics in linear algebra. Using a Macintosh window-and-mouse-oriented user interface, the student can create, edit, and manipulate matrices in matrix windows. With the mouse, the student can select portions of a matrix and choose commands from menus to perform basic computational steps of matrix algebra, including pivoting, matrix multiplication, component-wise addition, identification of the minimum element within a selection, and so on. The number and sizes of matrices simultaneously represented on-screen is limited mainly by available memory. Scroll bars are used for matrices too large to fit on the screen. A Recording command enables a student to record each step for the purpose of preparing homework assignments.

# Math and Statistics

## Linear Programming

This program does not itself implement the simplex problem-solving algorithm, or any other; in the author's experience, watching a "black box" program solve a problem on its own teaches little about the workings of an algorithm. MacSimplex makes the necessary computational steps easy and convenient, but leaves algorithm logic under user control.
**Current status**: Available from Kinko's Academic Courseware Exchange (ACE).
**Contact**: (ACE), 800-235-6919; in California, 800-292-6640

## Regression

MacRegression is a program used by Erasmus University to teach first-year students in economics the basics of regression-analysis with two variables. The author of the program has for many years taught SPSS to students in the final years of their study. He discovered that it is not difficult to teach students to create tables full of regression coefficients—t-values and so forth—but it is far more difficult and sometimes almost impossible to teach the student that the validity of the output depends on much more than the computed R and t- or F-values. When there is, for example, an outlier in the data, a student may get output that looks promising but in fact is nonsense. A probable cause for this noncritical behavior might be that students (and teachers) pay too much attention to nice-looking formulas and neglect to study the problems that arise when the technique is applied to real data. When using real data, one encounters all kinds of phenomena that are not covered by the model. Therefore, the common belief that learning the formulas qualifies you to apply the corresponding technique poorly reflects reality.

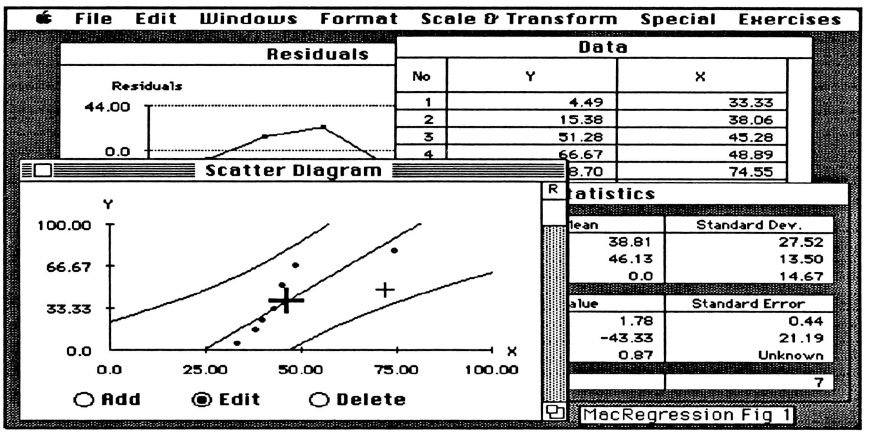
MacRegression was developed with these thoughts in mind. Its major goal is to create a quick interaction between input and output with the regression model simulation. So when the student changes the value of an observation, the regression line should be adjusted immediately. This goal was realized by allowing the user to drag (or add and delete) observations with the mouse; the regression line follows the dragging of an observation without delay. Furthermore, when you open the Statistics window or the Data window, you also get the same quick response when an observation is changed, added, or deleted. The Residuals window is the only window that is not updated during dragging, as this would involve redrawing the entire graph of the residuals, which would slow down the interactive process.

Apart from the regression line, the program can also show (in graphical form) the correlation coefficient, the means and standard deviations (in the form of a cross with varying length of its arms) and the 95% confidence interval of predictions done on basis of the estimated line.

Also available is a set of exercises. In the exercises, the student is confronted with a scatter-diagram of a set of observations. The student must then fit the least-square regression line. The set of exercises has been carefully tested on econometricians. Although no full guarantee can be given, it is reasonably sure that most regression experts will not survive the more difficult exercises.

## Regression

Documentation: Manual is 30 pages
Price: Consortium: $19; retail: $59.
Demo: If you want a demo version (without manual), send two empty disks.
**Current status**: Completed.
**Contact**: Cornelis Bongers, Erasmus University, Postbox 1738, 3000 DR Rotterdam, The Netherlands




## Graphic Math Depictions

With a Macintosh, a mouse, and a math program written at the University of Oregon, even a beginner can draw three-dimensional curves and begin to learn differential geometry theories. More advanced mathematicians can use the Help menu to find the differential equations for that curve and to learn how these equations are solved. As the user moves the curve, the equations change, and the computer calculates those changes and shows the user how it derives the new numbers. Another software program draws fractal curves. With this program, users draw simple constructions (a part of a line), and the computer constructs the rest of the object with intricate complexity. The premise of both of these programs is that anyone can graphically demonstrate complex math concepts and then begin to understand the calculations that support the abstract theories.
**Current status**: Completed and in use.
**Contact**: Dr. Richard Koch, Department of Mathematics, University of Oregon, Eugene, OR 97403; (503) 686-5630

## Statistics

At Brigham Young University, the statistics department's computer configuration includes access to a VAX 8600(VMS), MicroVAX(VMS), MicroVAX(ULTRIX), two DEC laser printers and a 23-node AppleTalk network. The AppleTalk nodes are installed in each statistics professor's office. The network is served with a 10+10 Bernoulli Box Network Server with a shared Apple LaserWriter. Faculty work with *S*, a mainframe statistics package, using Macintosh as a graphics terminal. Running MacWrite and VersaTerm under

# Math and Statistics

## Statistics

Switcher, professors generate data on the mainframe, then easily create reports, and tests, which are sent (via the AppleTalk network server) to a "finishing station" where an employee cleans up the text, adds equations with MacEqn and prints it on the LaserWriter.

TransScript from Adobe converts Vax TROFF files to PostScript files, which can then be sent to the LaserWriter via a program called ATPrint. Macintosh users can use a VAX program called MacWrite to TROFF to upload MacWrite files to the VAX and print them on the DEC laser printer.

There are three IBM PCs in the department with virtually unused 10+10 Bernoulli Boxes attached. Later this year the PC Bernoulli Boxes will be added to the AppleTalk network with TOPS. This will give the AppleTalk network four servers instead of one.

The Brigham Young statistics department also runs a Macintosh lab with 12 Macintosh systems which linked through a data switch to the statistics mainframe. The lab is open to all stat or stat/CS majors for statistics homework and is also used for class lab work. One professor uses the lab to model regressions in three dimensions using MacSpin. Statistics 221 will be a general education elective soon, and so to handle the influx of GE students, there are plans to use DataDesk in conjunction with the Macintosh lab as a teaching tool.
**Current status**: Completed.
**Contact**: Pete Dotson, Software Support/Hardware Maintenance, Statistics Department, 204-B TMCB, Brigham Young University, Provo, UT 84604; (801) 378-3484

## Statistics/Math

The math department at UC-Davis is teaching SmallTalk, using Macintosh XL computers and Tektronix terminals. The course is being taught and developed simultaneously, with considerable input from the students. The object of teaching this language is to expose students to the leading edge of technology so that they can more intelligently make choices about programming languages and perhaps take the technology even further. References being used are from the SmallTalk Orange and Blue books.
**Current status**: Ongoing.
**Contact**: Professor Jack Milton, Math Deptartment; (916) 752-3657

# Medicine

## Neurobiology: Waveforms and Filters

This program produces a high/low pass filter that is fully controlled by the Macintosh mouse.
**Current status:** Completed and available on Creative Solutions MacFORTH Demo Disk.
**Contact:** Bruce Land, Cornell University

## Analysis of Photomicrographs of Brain Cell Aggregates

Stephen Sellers has written a Microsoft BASIC program for the image analysis of photomicrographs of brain cell aggregates.
**Current status:** Running and available by request.
**Contact:** Stephen Sellers, Department of Pharmacology and Physiology, Abbott Hall 318, 947 E. 58th Street, Chicago, IL 60637; (312) 962-9331

## Ventilator Simulation

The program, designed by Professor Kohatsu, helps medical students learn about ventilator management. It computes and displays three kinds of information: data from the ventilator/lung processes, and recommendations or predictions.
**Current status:** Complete.
**Contact:** Mike Barlow or Karen Lee, IRIS, Cypress Hall, Stanford University, Stanford, CA 94305

## Electrolyte Disturbances and Treatment

Professor Maffly's program combines both instruction and testing of topics in the biochemistry of water and electrolytes.
**Current status:** Completed.
**Contact:** Mike Barlow or Karen Lee, IRIS, Cypress Hall, Stanford University, Stanford, CA 94305

## Pharmacy Simulations

This project's goals include incorporating computer simulations and modeling into clinical experimental rotations to assist in the development of patient consultations, utilizing user-friendly technology to facilitate student education, and implementing patient data bases.
**Current status:** In development.
**Contact:** Larry Ereshevsky, College of Pharmacy, University of Texas at Austin, Austin, TX 78712

# Medicine

## Ekteach

Teaches interpretation of the electrocardiogram and tests student with respect to the names of the EKG deflections, the amplitudes, and the time relationships of the normal EKG tracing.
**Current status**: Classroom testing.
**Contact:** Coordinator, Microcomputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104

## Model Neuron

This program simulates the behavior of a Hodgkin-Huxley model neuron interactively, relying upon a laboratory metaphor in its user interface. The user has control of electrical stimuli [current injection or voltage clamp] and chemical stimuli [acetylcholine and/or GABA]. The proportion of various membrane channel types and the concentrations of K+, Na+, and Cl- ions inside and outside the cell may be changed by the user as well. Several neurotoxins may be applied to the cell, together or separately. The program should be of use to students of neurobiology, biopsychology, and medical physiology.
**Current status**: Completed and in use in an introductory neurobiology course. The program will be revised based on feedback from Cornell students and others.
**Contact:** Barry Polley, E503 MVR—Dept. D&EA, Cornell University, Ithaca, NY 14853

## Animated Anatomy Tutorial

Students at Washington University Medical School are using a self-study course in human anatomy to depict cell development. The program shows a single cell developing in the womb from a single fertilized egg up to 12 weeks. This development depicts the evolution of the cell into external and internal surfaces of the body, and how these surfaces are then transformed into systems. A dissection on screen demonstrates surfaces and organ systems of the developing embryo. Other topics available on disk are the development of the digestive tube system and the development of the nervous system. Programs covering the circulatory system and genital-urinary system are currently under development. The animation provides three-dimensional instruction at a fraction of the cost of film.
**Current status**: Completed and ongoing.
**Contact:** Dr. Roy Peterson, Department of Anatomy, Washington University Medical School, 660 S. Euclid, St. Louis, MO 63110; (314) 362-5000

## Scan Analysis

Scan Analysis was developed to provide a low-cost image-processing system for biological and biochemical scientists. The system employs the ThunderScan digitizer, which digitizes autoradiograms, polyacrylamide gels, and more. The scan file obtained from ThunderScan is then processed using the Scan Analysis program. Three different modes of analysis are available: free-format area selection, area averaging and integration, and two-dimensional scanning and integration. The data obtained from Scan Analysis have been shown to

## Scan Analysis

correspond to the actual radioactivity being measured by autoradiography, and to actual protein concentration by dye binding. Coupled with ThunderScan, Scan Analysis brings quantitative image processing to scientists at a very low capital outlay.
Current status: Unknown.
**Contact:** Timothy Burcham, Department of Neurobiology, Stanford University School of Medicine, Stanford, CA 94305; (415) 497-5811

## Programs for Ecological and Statistical Analysis

Current status: Unknown.
**Contact:** A. Cockburn, Department of Zoology, Australian National University

## Diagnosing Maladies

The College of Veterinary Medicine at Mississippi State University is taking a new approach to diagnosing maladies. Faculty and students have harnessed high technology to enable them to arrive at the most accurate and complete diagnoses possible. Using the Macintosh computer and software program called "Problem Knowledge Coupler," the causes, findings, and diagnostic tests results are correlated. Take the example of feline anemia: There are 58 diseases that can cause anemia in a cat and 316 relevant findings (historical questions, diagnostic results, and so forth) that impact those diseases. Therefore, in this single diagnosis, there are over 18,000 interrelationships that need to be considered to arrive at the appropiate treatment. There is no way the human mind can retain that amount of information, but the computer can. Four coupler programs—including such as Feline Anemia and Canine Cough—are already in use at the school. Additional programs specific to different species are under development.
Current status: Completed.
**Contact:** Dr. Philip Bushby, Program Director, College of Veterinary Medicine, Mississippi State University, MS 39762-5521; (601) 325-3432

## Personal Choice

Personal Choice—A Guide to Selection of Birth Control, is a program developed by the Brown University Health Services center. It's the first in what is hoped will be a series of health education software aimed at a college-age audience. The program includes an illustrated review of reproductive anatomy and physiology, and an interactive section where the user answers questions about health history, lifestyle, and personal priorities. The program makes great use of the Macintosh interface with only one page of user documentation required. It's been very well-received, because it prepares a person for understanding the issues involved in making a decision about birth control.
Current status: Completed.
**Contact:** Anne M. Andrade, MSNP or Richard Linden, Associate Director at the Brown University Health Services; (401) 863-3953

# Medicine

## Anesthesiology

The anesthesiology department at Duke University is using Macintosh in the operating room to analyze blood pressure and oxidation level information. They track the data, enter it into an Excel spreadsheet, and then graph the trends.

The Medical School is also adding a Macintosh lab and will be transferring data between Macintosh computers and IBM PCs. They've also developed custom applications on the Macintosh using FORTRAN.
**Current status**: Completed.
**Contact**: John Lippert, Apple Higher Education Executive

## Cancer Research

Dr. Thea Tlsty is a very well-known and respected researcher at the University of North Carolina. Working in the Lineberger Center at the university, she is studying the causes of cancer at the DNA level. She uses the Macintosh for data input in the research lab, as well as Business Filevision for inventory control and explanations of equipment and various chemicals and solutions.
**Current status**: Completed.
**Contact**: John Lippert, Apple Higher Education Executive

# Miscellaneous

## Drexel Plot

A graphing package designed to plot on a grid data pairs entered from the keyboard or via a SYLK file.
**Current status**: Available through Kinko's Academic Courseware Exchange; 800-235-6919, or in California, 800-292-6640.
**Contact**: Coordinator, Microcomputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104

## BenchTop Products for the Sciences

The chief software products are The BenchTop, which creates a powerful laboratory network system, and Rascal (see description under "Computer Science"), a real-time Pascal. These applications allow the user to define and operate on-screen simulations of actual laboratory apparatus. The hardware products are a Universal Microcontroller, a laboratory single-board computer based on Intel microprocessors; and the BenchTop Instrument, a customizable, shielded instrument box. Both hardware devices talk to the Macintosh according to a rigorous protocol.
**Current status**: Universal Microcontroller completed. Consortium price: $500. Retail price: $750.
**Contact:** Metaresearch, Inc., 110 SE Woodward, Portland, OR 09702; (503) 232-1712

# Miscellaneous

## Lesson Writer

An authoring tool that enables the user to create short lessons using basic MacWrite procedures and any graphics that can be transferred via the standard Clipboard.
**Current status**: Available through the Academic Courseware Exchange.
**Contact**: Coordinator, Microcomputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104

## MacPress

Researchers at Brown (IRIS) are testing a program that allows documents created with MacWrite to be printed on the Xerox 9700 Laser Printer.
**Current status**: Completed.
**Contact**: Norm Meyrowitz, Scholar's Workstation Project, Brown University, Providentce, RI

## A Skeleton Macintosh Application

Skel is a skeleton demo Macintosh program written in Lisa Pascal that is used for teaching Macintosh development.
**Current status**: Completed. Now in Version 2.4. Send $4 for the disk.
**Contact**: Kinko's Academic Courseware Exchange, 800-235-6919; in California, 800-292-6640

## Atlas

Atlas lets you create a pictorial atlas on the Macintosh, which can be used to teach any subject.
**Current status**: Completed. Now in Version 2.2. Send $4 for the disk.
**Contact**: Kinko's Academic Courseware Exchange, 800-235-6919; in California, 800-292-6640

## Overlay

Overlay is a program for aligning MacPaint images in preparation for use in Atlas, which can display several images on top of one another.
**Current status**: Available from Kinko's Academic Courseware Exchange (ACE).
**Contact**: (ACE); 800-235-6919; or in California, 800-292-6640

# Miscellaneous

## Film Design

Communication students in a film and video class learn "storyboarding" by editing images using commercially available Macintosh software. First, the images are captured from a video source using a digitizing program, Macvision. These images can then be read into and sequenced in ThinkTank 512. A shot description heading is then keyed in for each image. For presentation purposes, the student has the option to either print out the story board or play back the images in sequence using the slide show feature of ThinkTank 512.
**Current status**: Ongoing.
**Contact**: Professor Kristine Samuelson, Department of Communication, Stanford University, Stanford, CA

## The TheaterGame

This program lets students use an interactive animation editor to move the characters across the stage and alter their orientation, effectively "blocking" a play on a Macintosh.
**Current status**: Available through Kinko's Academic Courseware Exchange; 800-235-6919, or in California, 800-292-6640.
**Contact**: Professor Larry Friedlander, Department of English, Stanford University, Stanford, CA

## Bibliomania

This simulation introduces students to the use of libraries on campus. The graphics-oriented program also guides students through the intricacies of searching periodical indexes and an on-line catalog.
**Current status**: Completed.
**Contact**: Deborah Murphy, Meyer Memorial Library, Stanford University, Stanford, CA

## Scientific Graphics.

Scientific data analyses will be the focus of this project. The user will have the ability to specify a function to be plotted or have a smooth line drawn between data points. No pie charts here!
**Current status**: Completion expected by October 1986.
**Contact**: Craig McGowan, Computer Center, University of Rochester, 727 Elmwood Avenue, Rochester, NY 14620

## MAC BRAID

This program computes the Alexander polynomial of a given knot. The knot is specified by giving the cross numbers of its braid representation. (Macintosh Pascal)
**Current status**: Completed.
**Contact**: Richard Bedient, Hamilton College, Clinton, NY 13323; (315) 859-4138

# Miscellaneous

## Mainframe Print Servers

As a value-added service provided to SEAGate, Macintosh users will be able to print their documents remotely using a VAX or Pyramid Computer as a print server for the LaserWriter or other PostScript machines. In addition, they will be able to convert MacWrite documents to troff to allow addition of technical features using Eqn.
**Current status**: Unknown.
**Contact**: Craig McGowan, Computer Center, University of Rochester, 727 Elmwood Avenue, Rochester, NY 14620

## Electronic Chalkboard

This project uses a Macintosh as a novel electronic chalkboard, permitting drama students in directing classes to illustrate body/eye focus and movement patterns of actors in harmony with recorded voices.
**Current status**: Completed.
**Contact**: Bernerd Engel, Drama, College of Fine Arts, University of Texas at Austin, Austin, TX 78712

## Drexel Disk

The Drexel Disk uses an interactive map of the Drexel University campus to orient new Macintosh users to the microcomputer-related facilities available. Send a self-addressed, stamped disk.
**Current status**: Available through Kinko's Academic Courseware Exchange; 800-235-6919, or in California, 800-292-6640.
**Contact**: Coordinator, Microcmputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104

## ColorPaint

Imagine painting a brilliant sunset using 16 million colors! Students at Reed College are learning about color theory as well as creating masterpieces using a Macintosh computer, a Vectrix color graphics machine with a large display monitor and a software product called ColorPaint. The artists can paint with 20 tools—including three-dimensional shading—on a screen that can display 512 colors at any one time. It's a compelling visual display of the power of personal computers and graphics. Photographs can be taken of the screen and then reproduced. With the Macintosh interface, the program is easily used by novices, artists, media students, and scientists. ColorPaint was developed using Rascal, a programming language for the Macintosh computer created at Reed College.
**Current status**: Completed.
**Contact**: Dr. Richard Crandall, Technology Plan Director, Reed Collge, Portland, Oregon 97202; (503) 771-1112 ext. 255

# Miscellaneous

## Creative Art on the Macintosh

In the School of Creative Arts at San Francisco State University, the blending of art forms is taking place through the use of Macintosh computers. Each one of the eight departments in the School of Creative Arts owns a Macintosh. In addition, there are up to 15 Macintosh computers in a unique interdisciplinary computer lab setting devoted to projects of the very creative students and their professors. Since September, a true meeting of the arts has occurred in the lab, where students of dance, music, film, theater, arts, broadcast communications, and the Center for Experimental Interdisciplinary Art have joined together to work on projects involving choreography, animation, costume design, and more. Besides using current commercial applications such as MacPaint and MacDraw, faculty and students are also developing their own software. The collaborative projects promise infinite possibilities for awakening aesthetic senses.
**Current status**: Ongoing.
**Contact**: Dr. August Coppola, Dean, School of Creative Arts, San Francisco State University, 1600 Holloway, San Francisco, CA 94132; (415) 469-1471

## Physical Education Lab

The College of Physical Education operates a Macintosh lab with 10 Macintosh computers, 9 external drives and 3 ImageWriter printers. The lab is open to students currently enrolled in physical education courses. It is used primarily by students in PE 191 for their computerized weight training and by graduate students using NCSS to do statistical analysis of performance levels.
**Current status**: Completed.
**Contact**: Tom Catherall, Recreation Management and Youth Leadership, 279 RB, Brigham Young University, Provo, UT 84604; (801) 378-4991

## KeyMouse — A Mouse-Driven Keyboard

The mouse-driven keyboard (KeyMouse) is a desk accessory program compatible with 128K, 512K, and Macintosh Plus computers. It requires no special system, and runs parallel with any program that supports desk accessories in the normal manner.

The KeyMouse DA allows handicapped users equipped with head-mounted mouse hardware to perform all keyboard functions, including typing, with an on screen version of the keyboard. The user types a character or makes a selection by moving the cursor to it and clicking. The Caps Lock, Shift, Option, and Command keys of KeyMouse are latching or "sticky" keys, allowing combinations such as Option-G or Option-C to be entered. The program also updates the system keyboard memory so that Option-click and Shift-click functions can also be performed. KeyMouse also works with dialog boxes. The physical keyboard can be used in conjunction with the KeyMouse screen keyboard. Except for repeating keys, almost anything the physical keyboard can do, the Keymouse DA can do.
**Current status**: Completed.
**Contact**: John Halleck, University of Utah Computer Center 3116 MEB SLC, UT 84112; (801) 581-6802

# Miscellaneous

## PCal — a Pocket (and other) Calendar Maker

If you're one of those totally organized folks to whom their "Pocket Planner" is second only to their 27-function digital stopwatch, PCal may just be the program you've been waiting for. PCal lets you simply and easily create your own planner and other styles of calendar for printing on the ImageWriter or LaserWriter printer. The program allows the designer to enter over 500 personal events (birthdays, anniversaries, meetings, and conferences) and local holidays in addition to the 16 preprogrammed holidays. On-line Help gives instructions for entering and modifying dates and events.

With PCal you can create the following calendar types:

| TYPE | SIZE | ORIENTATION |
|---|---|---|
| Year | 8.5 x 11 | Landscape or Portrait |
| Month | 8.5 x 11 | Landscape or Portrait |
| Week on a page | 4.25 x 5.5 | Portrait only |
| Week on two pages | 4.25 x 5. | Landscape only |
| Day on a page | 5.5 x 8.5 | Landscape only |
| Day on a page | 8.5 x 11 | Portrait only |
| Day on two pages | 5.5 x 8.5 | Landscape only |
| Day on two pages | 8.5 x 11 | Portrait only |

Calendars can be printed on both sides of the paper so they can be assembled into "book" form with the pages in proper order. For pocket calendars, the pages must be cut, stacked, and folded to produce the finished product.
**Current status**: Completed.
**Contact**: Joseph F. Buchanan, University of Utah Computer Center 3116 MEB SLC, UT 84112; (801) 581-6802

# Music

## Mozart

Mozart offers music students with no formal composition experience the opportunity to experiment with musical arrangement, tempo, articulation, and dynamics, allowing them to compose a minuet from any of six predefined two-measure phrases written by Mozart.
**Current status**: Available from Kinko's Academic Courseware Exchange (ACE).
**Contact**: ACE, 800-235-6919; in California, 800-292-6640

# Music

## AppleTones

AppleTones is a music-building program on the Macintosh that teaches the importance of four things in the composition and arrangement of music: repetition, silence, changes in volume, and timbre.
**Current status**: Comes on disk with Mozart. Now in Version 2.0.
**Contact**: Kinko's Academic Courseware Exchange, 800-235-6919; in California, 800-292-6640

## Baroque Guitar Data Base

To date, over 2,000 separate melodies have been entered into the system, with each entry including author, title, source, page, meter, time signature, key, length, melody (in the original key), melody (transposed to the key of C), type of piece (allemande, courante, prelude, and so forth), correspondences in other sources, and additional notes of interest.
**Current status**: Ongoing.
**Contact**: Craig H. Russell, Department of Music, California Polytechnic State University, San Luis Obispo, CA 93407

## Simulation of 18th-Century Organ

A simulation of an 18th-century organ in order to illustrate the musical articulation and phrasing of the time. The program, devised by Professor Houle of the music department, will produce sound and musical notation.
**Current status**: Completed.
**Contact**: Mike Barlow or Karen Lee, IRIS, Cypress Hall, Stanford University, Stanford, CA 94305

## Fundamentals of Music

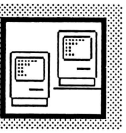
A program is being developed for instruction in the fundamentals of music. The first module, which should be completed by the end of summer, deals with intervals and harmony. It has two unusual features: it makes use of sampled sound to provide more realistic tones for interval recognition, and it is not limited to the 12 pitch classes of equal temperament. It will be smart enough to drill students interactively on interval spelling and recognition in either the standard equal temperament or one of several others, but it will also be possible to use it for experimentation—to hear the sounds of various intervals and harmonies as they would be interpreted in different systems of intonation. One of the on-screen keyboards has its claves divided into regions so that a particular enharmonic spelling may be selected. The program is called Practica Musica and is primarily intended for university music education.
**Current status**: Ongoing.
**Contact**: Jeffrey Evans, Department of Music, University of California, Santa Barbara, CA 93106

## Music

### Musical Slide Show

With no programming instruction, users can write music on the screen (notation that can be printed out), hear the score played through the Macintosh's speaker (or an external system), add text and graphics as required, and edit the results to form a "slide."
**Current status**: In development.
**Contact**: Coordinator, Microcomputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104

## Networks



### AppleTalk Network

Darterminal provides network services to Macintosh computers on an AppleTalk network (internet). It runs protocols specific to Dartmouth's Kiewit network and will not run elsewhere without substantial work.
**Current status**: Completed (improvements continuing).
**Contact**: Jim Perry, Kiewit Computation Center, Dartmouth College; (603) 646-2643

### SEAGATE

SEAGATE is a network "gateway" between Ethernet and AppleTalk that allows UNIX to provide servers for Macintosh AppleTalk applications.
**Current status**: Completed.
**Contact**: Maria Code, Data Processing Services, 1371 Sydney Drive, Sunnyvale, CA 94097; (408) 735-8006

### Washington University Campuswide Network

Washington University is building a campuswide network capable of transmitting pictures between workstations throughout the schools of liberal arts, engineering, medicine, and six other professional schools.
**Current status**: Continuing.
**Contact**: Jerome Cox, Ph.D., Chairman, Dept. of Computer Science, Washington University, 509 Bryan Hall, St. Louis, MO 63130

### Agriculture-related Information System

Macintosh computers link the 67 offices in the Pennsylvania State University Cooperative Extension Service to the university mainframe, providing county agents and extension faculty with the latest information on agriculture-related issues. Called the Pennsylvania Extension Network (PEN), the on-line information and communications system also enables farmers and other residents

# Networks

## Agriculture-related Information System

throughout the state to communicate electronically via a personal computer and modem. The network has helped in emergency situations, such as a recent outbreak of salmonella; within hours a public statement and a seven-page background report on the disease reached every county. Also, in many non-emergency situations information has reached farmers, pathologists, county agents, and Pennsylvania residents in a matter of minutes. Additional services provided by this project include development of software programs for Apple Macintosh computers that focus on agriculture, administration, 4-H youth, and family living. The Milk Market Comparisons, Land Rent Calculator, and Dairy Barn Ventilation Sizing are just a few of the programs already available. Many of the programs come in the form of templates.

**Current status**: Completed and ongoing.

**Contact**: Dr. Graham E. Bell, Support Services Manager, Cooperative Extension Service, 344 Agricultural Administration Building, University Park, PA 16802; (814) 863-3449

## Instructional Science

The Instructional Science Department has a LaserWriter and ImageWriter on a faculty AppleTalk network, as well as a graduate lab with AppleTalk network and data-switch connections to campus mainframes. The department has been experimenting with a Macintosh programming class using TML Pascal to teach elements of the Macintosh interface—windows, menus, QuickDraw, and so on.

**Current status**: Completed.

**Contact**: Paul Merrill, Instructional Science, 201-B MCKB, Brigham Young University, Provo, UT 84604; (801) 378-7072

## Physical Education Projects

The College of Physical Education has two Appletalk networks. One, used in the college offices, connects six Macintosh Plus systems (three with LoDown 20 SCSI hard disks), a LaserWriter Plus, and two ImageWriter II printers, and is served by a Bernoulli Box 10+10 network server. The three hard disks will soon be connected to the network with TOPS to make it possible to access any hard disk from any Macintosh. This net is used primarily for printer sharing, hard-disk backup, and some data sharing for software development. The other network connects four Macintosh Plus systems that are used by the college programmers for software development. Currently being developed:

• A program to control inventory for the college. The College of Physical Education has hundreds of thousands of pieces of equipment. To better control and inventory the equipment, this program will use a bar-code reader to first read equipment users' student information from their student ID card, then the equipment ID (basketball, racquet, football, net) from printed bar codes in the equipment checkout room. The program will ask for the number of the specific item (basketball #23, racquet #15). In this way, lost or damaged items can be immediately traced. When an item becomes broken, a precise equipment usage report can be generated by the program to see how many hours (or days or

minutes) that particular item has been used, and this can be compared with the product warranty. Expected completion: fall 1986.

## Physical Education Projects

•A program to run the 1988 NCAA Track and Field Finals, to be held at Brigham Young University. A smaller version of this program (using Omnis 3) is complete and was already used successfully at BYU when it hosted the Utah 3A High School Track and Field Championships. The high school program schedules each contestant's heat and lane. Upon finishing, the times (or distances) are entered, then the program automatically calculates the winner and rankings, schedules the atheletes in the next heat and assigns them a lane based on an algorithm that puts the fastest runners in the fastest lanes. This information is available immediately for coaches, atheletes, press, announcers, and so on. At the NCAA Finals, 20 or so Macintosh computers will be networked using a Corvus OmniNet: one system in the announcer's booth, one at the finish line, one at the long-jump pit, one at the pole-vault pit, and so forth. Data entry clerks will sit at each Macintosh and enter scores interactively as they happen. All other users will have immediate access to the scores by simply pulling down a menu that describes the event; the current standings will be listed. Expected completion: winter 1987.

•All PE 191 (weight training) students use a computerized training system that prescribes the appropriate exercises, weights, and repetitions for each student based on a test that determines the one-repetition maximum of each of six basic exercises. The software plans out training courses in general fitness, body building, and power training, and includes three phases in each course. Every three or four weeks, the program changes the training plan to include more weight, fewer repetitions, and a change in exercise. Training programs can be individually altered according to changes in student circumstances. Each student enrolled in PE 191 must buy the $12 program which uses the runtime Microsoft BASIC interpreter, and Macintosh computers are made available in the PE Macintosh lab.

**Current status:** Unkown.

**Contact:** Bruce Holley, Chairman, Physical Education Services, 112 RB, Brigham Young University, Provo, UT 84604; (801) 378-3994
Barry Jenkins, 1972 N. Main, Orem, UT 84606; (801) 224-6834

## IAS Lab/Workshops

Brigham Young University Instructional Applications Services conducts weekly free workshops on Macintosh software for faculty staff and students. The workshops are taught in a specially built lab with ten Macintosh computers. Workshop instructors have found that workshop attendees are often so fascinated by the Macintosh interface (Control Panel, puzzle, clicking and dragging, and so on) that they neglect to listen to the instruction and go home no more proficient than when they came, so a method was worked out to solve this problem. One Macintosh is the master, and the other nine are slaves. The instructor has a panel of switches that control the video output of each slave. In this way, the instructor can "take over" the screen display of every slave (or selected individual slaves) so that students see exactly what is on the master's screen, and don't "doodle." This also makes it easy for the instructor to demonstrate a certain

# Networks

## IAS Lab/Workshops

concept, and then give control back to the students to practice it on their own. The master has a video output port for projection onto a lab screen.

The lab is also available for individual rental (for as low as $0.50/hour bulk) and faculty can reserve it for use by their classes.
**Current status**: Completed.
**Contact**: Harold Hendricks, Computer Teaching Services, 2330 HBLL, Brigham Young University, Provo, UT 84604; (801) 378-2647

## Computer Consultation Center

Computer Applications Services serves the entire campus with the Computer Consultation Center (CCC). Open 8 to 5 weekdays, the CCC provides a walk-in, hands-on environment where students and faculty have access to most major computer periodicals, a large collection of public domain software, and more. Programs can be tried out in the center itself or checked out overnight. The availability of software for checkout (with documentation) has been a convenient incentive to refrain from making illegal copies of software when "test-driving" it for suitability.

Consultants make office calls on campus to solve site-dependent problems. In a separate location, two consultants man a telephone bank to answer call-in questions on any computer subject from mainframe to Macintosh. In front of each "phone consultant" is an IBM PC and a Macintosh with a LoDown 20 SCSI hard disk. This gives the consultants virtually instant access to the same software the caller is using, so they can work through the problem together.

The CCC staff hold weekly training meetings so that each consultant can become proficient on most major software packages. CCC computers and printers are available for rent from 5 P.M. to 8 P.M.—$1/hr for computers, 10¢/page for printing.

The CCC also runs a free bulletin board service with FIDO software on an IBM PC AT with 4Mb RAM, and 40Mb hard disk. Both IBM PC and Apple Macintosh interest areas are supported with public domain software and Macintosh news and information.
**Current status**: Completed.
**Contact**: John Edwards, Technical Coordinator, Computer Consultation Center, 169 TMCB, Brigham Young University, Provo, UT 84604; (801) 378-7699

## YNET

Brigham Young University's central campus network (called YNET ) connects twelve mainframe computers: six VAX 750s, two VAX 8600s, three IBM 4341s, and an NAS 9000. Many campus departments use the Macintosh as (among other things) a terminal to computers on YNET, with the help of specialized software and hardware. Access to the IBM and NAS mainframes is through a data switch that connects directly to a HYDRA 3270 protocol

converter, which converts ASCII character streams, allowing the Macintosh to emulate a locally attached 3270.

VaxToPC and PCToVax are VAX file transfer programs that do data transfer between the VAX 8600 and personal computers. These programs allow for MacTerminal 1.1, XModem, ASCII, and VTerm file transfer protocols.

The KERMIT protocol is supported on all campus mainframes.

"MacShare" is an electronic-mail service provided on YNET for Macintosh enthusiasts. Any Macintosh-related information, rumors, or questions are mailed electronically to an address called "MacShare." Then network software distributes the message to all people on the MacShare distribution list. A message tells users that there is mail waiting for them the next time they log on to YNET (or immediately, if they are already logged on). YNET is a part of BITNET, so BYU Macintosh users have almost instant access to other Macintosh users all over the world.

## YNET

Current status: Completed.

**Contact: YNET**—Jim Eggett, Information Systems Services, 167 TMCB, Brigham Young University, BrighamYoung University, Provo, UT; 84604, (801) 378-5025
**PC to Vax/Vax to PC**—Jim Logan, Information Systems Services, 403 CB, Brigham Young University, Provo, UT 84604; (801) 378-6551
**MacShare**—John Taylor, Harold B. Lee Library, 3008 HBLL, Provo, UT 84604; (801) 378-6278

## Evaluation of Macintosh and IBM PC Local Area Networks

At Argonne National Laboratory, which is operated by the University of Chicago for the U.S. Department of Energy, computing services has completed a project to evaluate, demonstrate, and recommend standards for personal computer local area networks. We analyzed the use of personal computers at Argonne and developed a plan to limit our investigation of local area networks to those networks that provide connections for Apple Macintosh and IBM personal computers. We identified functional requirements that we considered necessary to integrate personal computers into the laboratory's hierarchy of computing resources and set the scope of the project at a level that would allow completion of the evaluation in a reasonable time frame (several months).

Computing services evaluated several commercially available alternatives based on the technical requirements and decided on the phased implementation of two local area networks. In Phase I, two networks were installed. We implemented the AppleTalk Personal Network from Apple Computer to connect eight Apple Macintosh systems, an Apple LaserWriter, and a TriData Communications Server (a gateway for IBM 3270-type terminal emulation access to IBM host computers). We also installed a 3Com EtherSeries Ethernet-based network to connect seven IBM PCs, a 3Com network server, a Hewlett Packard LaserJet printer, and a Bridge Communications Server. During Phase II, we installed a

# Networks

## Evaluation of Macintosh and IBM PC Local Area Networks

gateway between the two networks in order to provide similar capabilities to Macintosh and IBM PC users on the networks and to enable the exchange of PC-DOS and Macintosh files. We installed the 3Com EtherMac products as a gateway between the networks and to extend the EtherSeries shared disk and printer capabilities to the AppleTalk network. The Phase I installation began in October 1985 and we completed the evaluation in February 1986. A summary of the project was published in an Argonne document (Technical Memorandum 438) in March 1986.

Computing services' experience during the project led to the following conclusions:

- Local area networks can increase the usefulness of personal computers by allowing resources to be added incrementally at small marginal costs.
- Local area networks involve costly initial investments for cabling and shared resources.
- Local area networks can increase the speed of some personal computer operations by making high-performance devices available.
- Manpower and expertise are required to design, install, and manage these networks as well as to install applications software and train and assist users.
- User acceptance of the networks was good overall. The more sophisticated personal computer users found the networks to be useful tools that expanded their capabilities. Less experienced users needed more guidance and training to appreciate the new capabilities.
- Most local area networks lack the sophisticated communications to transfer files to host computers outside the local network.
- The availability of multiuser software for personal computer networks may be a limiting factor in establishing a successful network.

Argonne's networking goal is a not-too-local, local area network. Argonne is a campus-type environment. As local area networks are installed within buildings, the need arises to communicate among different networks within the campus. A laboratorywide network is thus required. Such communications will involve networks of various protocols: DECnet, TCP/IP, XNS, AppleTalk, NJE, and SNA. Ideally, users will be able to send and receive files transparently, as if they were all physically connected to a single network. Argonne's computing services plans to continue working toward this goal.
**Current status**: Phase I completed, additional work ongoing.
**Contact**: Linda Winkler, Computing Services, Argonne National Laboratory, 9700 South Cass Ave., Argonne, IL 60439

## Networking

The Harkness Project was set up as a pilot project to network computing services at Brown University. The students join a cooperative organization that allows them to manage the computing services themselves. Development at Brown has resulted in the creation of a wiring hub that extends AppleTalk and allows Macintosh and IBM PC computers to connect to network devices. Each

dorm room has a twisted pair and coaxial cable connection that gives all students access to laser printing, hard-disk storage, and high-speed mainframes. The Harkness Library is now a computer center where students can go to work and study. It's the preferred working and learning center and has promoted a true learning collaboration among students.
**Current status**: Completed.
**Contact**: Stephen Andrade, IRIS; (401) 863-2824.

- Networking

## Nutrition and Food Science

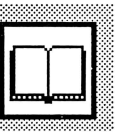
A nutrient analysis system that includes data on approximately 1,400 foods and calculates the RDA on specific nutrients and prints to final reports.
**Current status**: Classroom testing.
**Contact**: Coordinator, Microcomputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104

- MacDiet

These are Multiplan programs designed to solve nutritional composition problems involving linearly additive dietary elements as well as computation of the chemical score, an index of relative protein quality.
**Current status**: Available (Delphi and CompuServe).
**Contact**: Coordinator, Microcomputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104

- Newdiet and Prodiet

## Philosophy



This program allows the student to solve syllogisms by using Venn diagrams.
**Current status**: Available from Kinko's Academic Courseware Exchange (ACE).
**Contact**: ACE, 800-235-6919; or in California, 800-292-6640

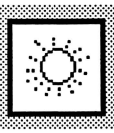
Venn, a Philosophy Tutor

# Philosophy

## Boole and Frege (for logic learning)

These two programs allow student practice and tutorial use of truth tables and natural deduction systems. While software for such purposes has existed for some time, this suite of programs aims to be easily usable by computer illiterates and to minimize the clerical work associated with proper proof procedures and presentation. Use of the keyboard is only required for input of assumptions and one's own problems. All other work is done by mouse manipulation. For example, the truth-table program draws the table and simply invites input of values. In natural deduction proofs, the student simply clicks on proof lines, clicks on the rule, clicks on DoIt, and gets a good line or a diagnosis of errors. In general, the system follows the conventions of Lemmon's beginning logic.

The programs are written in MacModula2 and embedded in them but modularised is a Macintosh interface that could be employed in other similar applications.
Current status: The truth-table program (Boole) and the propositional calculus natural deduction system (Frege) are complete. The predicate calculus system should be ready around October 1986. Send $7 for disk and postage.
**Contact:** David R. Bell, Department of Philosophy, The University GLASGOW, G12 8QQ, Scotland U.K.; (041) 339-8855



# Physics

## Interference Scanning Using ThunderScan

Current status: Unknown.
**Contact:** M. Andrews and J. Sandeman, Department of Physics, Australian National University

## Interface with LeCroy Fast Digitizer Through IEEE 488 Bus

Current status: Unknown.
**Contact:** M. Andrews and J. Sandeman, Department of Physics, Australian National University

## General Teaching Applications in Physics using PASCAL Workshop

Current status: Unknown.
**Contact:** Dr. C. Edwards, Department of Physics, University of Western Australia

# Physics

## Elementary Particle Theory

Four programs (of a total of eight) have been developed by Prof. Savas Dimopoulos for a physics series on elementary particle theory and on symmetrics and Lagrangians.
**Current status**: Completed and continuing.
**Contact**: Prof. Savas Dimopoulos, Stanford University, Stanford, CA

## Freshman Physics Lab

A set of data-acquisition tools, partially based on the Reed College DeskTop hardware, for the freshman physics lab.
**Current status**: Completed and in use.
**Contact**: Craig McGowan, Computer Center, University of Rochester, 727 Elmwood Avenue, Rochester, NY 14620

## Physics Simulations

A series of simulations (based on rapid animation) to enable students to explore atomic theory, diffraction, electrostatics, harmonic motion, magnetism, monopoles, orbital physics, projectile motion, quantum mechanics, radiation, and special relativity without inappropriate or tedious calculations.
**Current status**: Available Kinko's Courseware Exchange; 800-235-6919, or in California, 800-292-6640
**Contact**: Professor Blas Cabrera, Department of Physics, Stanford University, Stanford, CA 94305

## Animated Waves and Particles

Three animated graphics programs illustrate standing waves, traveling pulses, group velocity, sound waves, and electromagnetic waves; pressure, temperature, and gravity effects on an ideal gas, Brownian motion, diffusion through a hole, and electric and magnetic effects on moving charges; and the wave properties of an electron in an atom.
**Current status**: To be completed in fall 1986.
**Contact**: Eric T. Lane, Physics Department, The University of Tennessee at Chattanooga, Chattanooga, TN 37403-2598; (615) 755-4523

## 6502 Emulator

This program, written in BASIC, may be used for practice in assembly-language and machine-language programming of 6502 microprocessor-based systems. One window is used for writing and editing programs using assembly-language mnemonics. Another window shows the program listing. Other windows show and allow changes in the first 16 zero page memory locations, 16 other selected memory locations, and the processor status register. A step-mode window is used to step through a program with the effects on memory and the processor status register clearly displayed. A run mode is also available but is slow

# Physics

## 6502 Emulator

because of the interpreter operation. Programs may be saved, and complete listings may be printed. Most of the 6502 instruction set is included. The program was written by David J. Zhu.
**Current status**: Completed.
**Contact**: Philip H. Sutter, Department of Physics, Franklin & Marshall College, Lancaster, PA 17604; (717) 291-4136

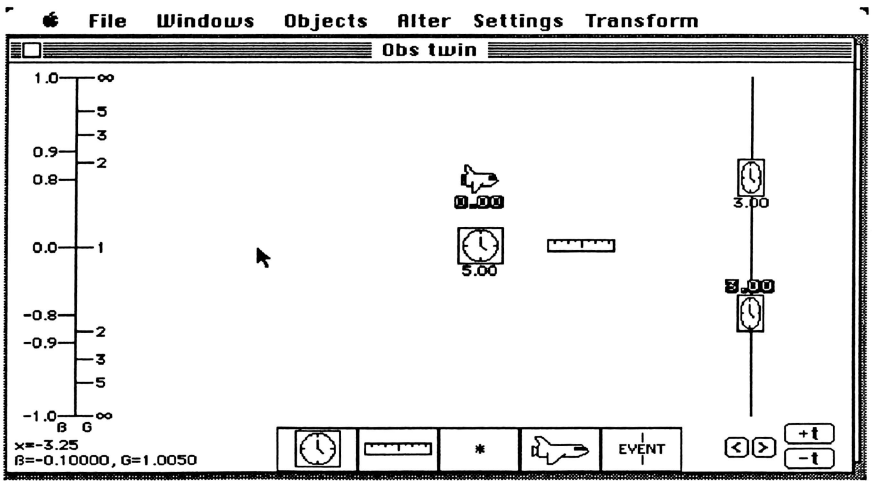
## Chaos Primer

A collage of programs has been written that illustrates numerous classic examples of chaotic behavior. The Chaos Primer shows the evolution of attractors and strange attractors with fractal dimensionality. Extensive references are included.
**Current status**: Completed in summer 1986.
**Contact**: Dr. Russ Larsen, Department of Chemistry, Texas Tech University, Lubbock, TX 79409; (806) 742-3057

## Modeling Toolkit in Special Relativity

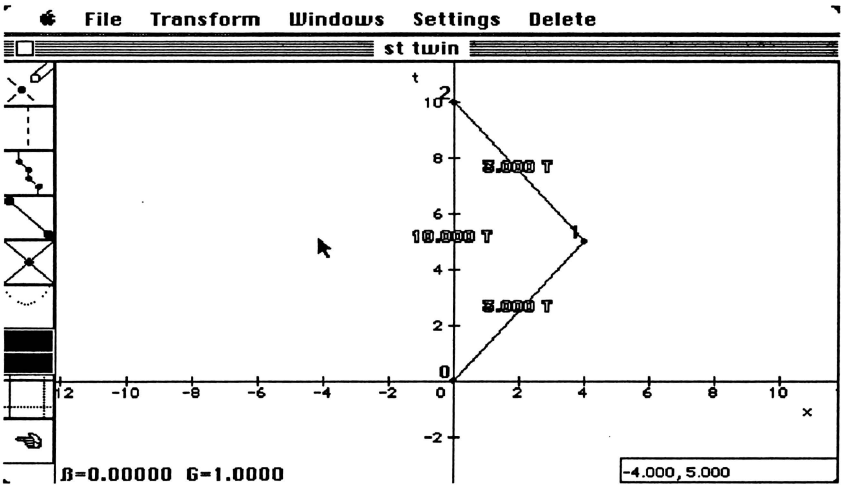
Four "computer graphics toolkit" displays used by students to solve problems in special relativity. Embodying models of the world of the very fast, these interactive graphics utilities help students to visualize and develop an intuition for phenomena that cannot be experienced firsthand.

• OBSERVER. Clocks, rods, light flashes, and events are placed on a superhighway whose lanes represent different speeds. Motions and events are observed from the viewpoint of any clock or rod or from a shuttle that can change speeds and directions. Helps solve exercises exemplifying many difficult concepts in relativity, such as time stretching (Twin Paradox), Lorentz contraction, and relative synchronization of clocks.



## Modeling Toolkit in Special Relativity

• SPACETIME DIAGRAM displays the locations of events in space and time on horizontal and vertical axes, respectively. The operator places light cones, invariant hyperbolas, straight worldlines, and the segmented world line of a shuttle that changes speeds and directions on the diagram. The program transforms the display to any reference frame in motion relative to the original frame.




OBSERVER and SPACETIME DIAGRAM share files to avoid double entry.

• MOMENTUM-ENERGY DIAGRAM analyzes collisions, creations, transformations, decays, and annihilations of particles moving in one spatial dimension. Displays momenta and energies of particles on horizontal and vertical axes, respectively. Separate BEFORE and AFTER displays allow matching of total energy and momentum before and after interaction to satisfy conservation laws. Displays can be transformed to other frames in relative motion, including the analytically important frame of zero total momentum.

• COLLISION provides a more formal analysis of the results of particle interactions in two spatial dimensions. The user enters on a table what is known about the masses, energies, and momenta of particles entering and leaving a collision. The computer calculates the unknown entries, displays results on three-dimensional perspective momentum-energy diagrams, and shows an animated "movie" of the interaction. Can also transform to the zero momentum frame of any particle or the frame of zero total momentum.

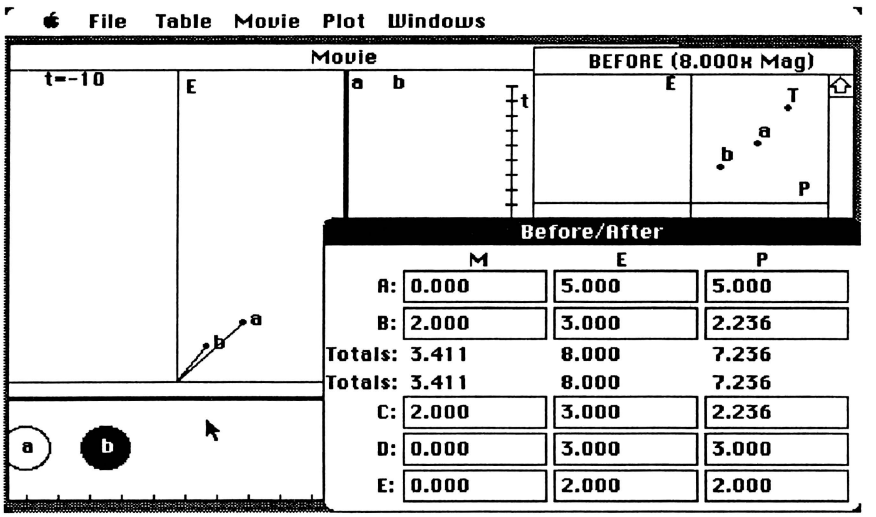
# Physics

## Modeling Toolkit in Special Relativity

COLLISION and MOMENTUM-ENERGY DIAGRAM share files for interactions in one spatial dimension.
**Current status**: Completed and continuing.
**Contact**: Edwin F. Taylor, Department of Physics, Massachusetts Institute of Technology, Cambridge, MA 02139

## Elementary Quantum Mechanics

Five programs that compute the following: transmission/reflection coefficients and energy eigenvalues for bound states (in piecewise constant potentials); energy bands and density of states (in one-dimensional, piecewise, continuous periodic lattices); energy eigenvalues in arbitrary binding potentials.
**Current status**: Clasroom testing.
**Contact**: Coordinator, Microcomputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104



# Psychology

## Stimuli for Recognition Memory Experiments

In 1980, Snodgrass and Vanderwart published norms for 260 line drawings. Each drawing is rated on name agreement, image agreement, familiarity, and visual complexity. These stimuli have been digitized and stored in MacPaint format for easy use in memory experiments.
**Current status**: Completed. Price: $15 for two disks, payable to Rice University Psychology Department.
**Contact**: David M. Lane, Department of Psychology, Rice University, Houston, TX 77251-1892; (713) 527-8101 ext. 3412

## Three Products

Machine-language library for use in psychology experiments, demonstration experiments in psychology, and geometrically rotated text.
**Current status**: Completed. Purchase price—all three disks for $15. Make checks payable to Rice University Psychology Department.
**Contact**: David M. Lane, Department of Psychology, Rice University, Houston, TX 77251-1892; (713) 527-8101 ext. 3412

## Mac Laboratory Interfaces

Psychology Professor Allan Wagner is currently investigating use of the TAURUS system with MACQUISITION, a product of Small Business Computers of New England, in his animal learning lab.
**Current status**: Continuing. Version 1.2 available. Version 2 status unknown.
**Contact**: Prof. Allan Wagner, Yale University, c/o Box 220, Yale Station, New Haven, CT 06520

## Experimentation Package for Human Information Processing Research

This program allows the user to carry out sophisticated experimental psychology research in the study of human information capabilities.
**Current status**: Unknown.
**Contact**: Salvador Algarabel, Universidad de Valencia, Facultad de Psicologia, Blasco Ibanel, 21, 46010, Valencia, Spain; (96) 3694850 ext. 213

## Biopsychology

The Macintosh mouse and MacPaint software were used to track and record animal behaviors in an arena under different conditions of thermal and neuroendocrine manipulation.
**Current status**: Completed.
**Contact**: Timothy Schallert, University of Texas, Austin, TX 78712

# Psychology

## MacLaboratory for Psychology

Provides research-grade software and university-level interactional teaching materials. Total package consists of a laboratory manual designed for introductory or experimental psychology, five disks, and documentation. Most applications create an adjustable piece of psychological apparatus, providing tools for real research activities. There are six components:

• Part 1: Perceptual and Motor Skills. Various experimental settings permit the study of motor skill learning and eye-hand coordination using such tasks as mirror tracing and pursuit rotor tracking.

• Part 2: Problem Solving. Used to investigate the social interaction of group size with task difficulty.

• Part 3: Polygraph. Simulated GSR (Galvanic Silicone Response) that—with appropriate user interaction—can illustrate orienting response, habituation, classical conditioning, extinction, spontaneous recovery, partial reinforcement, and other concepts from the psychology of learning.

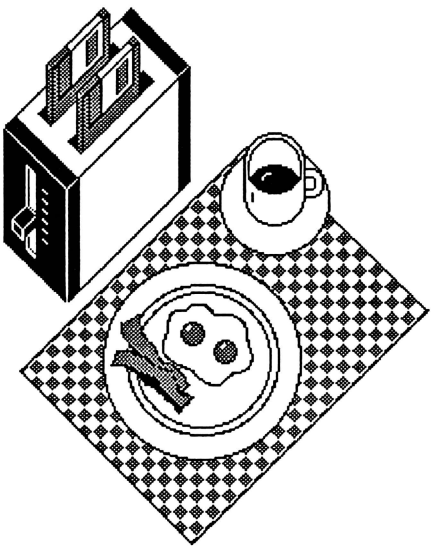
• Part 4: Pitch Discrimination. Waveform, frequency, amplitude, and duration can be modified and arranged into various sets for auditory testing.

• Part 5: Survey Questionnaires and Survey Data Summary. Applications facilitate the collection and simple summary of survey data.

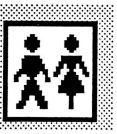
• Part 6: Neuropsychology and Learning-Megaroids, an entertaining game, is used as an "icebreaker" and a source of data for instruction in experimental design. Also includes authoring software instructor can use to provide instruction in anatomy and physiology.

**Current status**: Classroom testing.

**Contact**: Coordinator, Microcomputer Program, Office of Computing Services, Drexel University, Philadelphia, PA 19104



# Sociology



## SocStat: A Program to Compute Sociological Statistics

SocStat uses data sets from actual sociological surveys and allows the student to do elementary statistical analyses on them.
**Current status**: Completed. Send $4 for the disk.
**Contact**: The Personal Computing Center, McNutt Hall, Dartmouth College, Hanover, NH 03755

# Telecommunications

## Kermit

Developed by: Andrea Martin—Rice University
Kermit lets microcomputers and mainframe computers communicate and transfer files safely.
**Current status:** On hold.
**Contact:** Andrea Martin, ICSA, Rice University, Houston, TX 77251; (713) 527-4965

## Macintosh Kermit

The Columbia University Center for Computing Activities completed a Kermit program that provides file transfer and terminal emulation for the Macintosh and Macintosh XL computers, allowing them to communicate with a large and diverse collection of mainframes, minicomputers, and microcomputers.
**Current status:** Available now.
**Contact:** Kermit Distribution (212) 280-3703

## SEAGate

The Stanford Ethernet—AppleTalk Gateway (SEAGate) is being implemented.
**Current status**: Complete.
**Contact**: Craig McGowan, Computer Center, University of Rochester, 727 Elmwood Avenue, Rochester, NY 14620

## MacShell—A Sophisticated Terminal to UNIX

MacShell provides a sophisticated multiwindow interface to the UNIX operating system.
**Current status**: Unknown.
**Contact**: Tim North, Department of Computer Science, University of Western Australia, Stirling Highway, Nedlands 6009, Western Australia

# Telecommunications

## LaserTerminal: Serial-to-AppleTalk Gateway

LaserTerminal is a program developed at Reed College that makes the Macintosh function as a gate between an RS-232 serial line (for example, from a mainframe computer) and AppleTalk, enabling LaserWriter printing of PostScript documents.
**Current status**: Completed.
**Contact**: Marianne Colgrove, Education and Documentation Coordinator, Development Lab, Reed College, Portland, OR 97202

## GriffinTerminal 100

GriffinTerminal 100 (GT100), developed at Reed College, is a terminal-emulation application for the Macintosh that can function in either Tektronix 4012 or VT100 mode, and can handle technical graphics.
GT100 is available through Metaresearch, Inc., 1100 SE Woodward, Portland, OR 97202; (503) 232-1712. Price: $99 (academic discounts available).
**Current status**: Completed.
**Contact**: Scott Gillespie, Software Development Manager, Development Lab, Reed College, Portland, OR 97202; (503) 771-1112 ext. 277

## Communications Link with Sigma Data WP Units

**Current status**: Complete.
**Contact**: J. Radnell and P. Wesely-Smith, Department of Asian Studies, Australian National University

## Communications Link with Epson WP Unit

**Current status**: Unknown.
**Contact**: J. Radnell and P. Wesely-Smith, Department of Asian Studies, Australian National University

## Macintosh Videotex Terminal Emulation

**Current status**: Unknown.
**Contact**: K. Loane, Information Science, University of Tasmania

## MacWrite to Scribe Formatter

**Current status**: Unknown.
**Contact**: David Hawkins, Computer Science, Australian National University

## Tincan: A Terminal Emulator for the Macintosh

Tincan is a terminal emulation and file transfer program for the Apple Macintosh. With Tincan, your Macintosh can be connected to a host computer (mainframe), and used as if it were a terminal normally used to connect to a mainframe timesharing service. Instead of logging on through a DEC VT100 or Datamedia 1520 terminal, you can use the Macintosh to log on to IBM's VM/CMS or MVS/TSO, DEC's VAX/VMS, or UNIX 4.2. In addition,

## Tincan: A Terminal Emulator for the Macintosh

Tincan is designed to operate well in conjunction with the Yale ASCII Communications System (an IBM Series/1 with Yale ASCII software, the IBM 4994, or the IBM 7171), a product that allows ASCII terminals to access IBM mainframes as IBM 3270-style full-screen terminals.

If you have any implementation of Yale ASCII attached to your mainframe, then in conjunction with Tincan on the Macintosh, you get IBM 3270 support, with some enhancements. By installing PCTRANS (a host command available for a nominal charge from the Yale Computer Center), Tincan can perform error-free file transfer for the movement of Macintosh text files, binary data files, or entire Macintosh applications (application transfer utilizes the MacBinary protocol) between Macintosh and IBM VM/CMS or MVS/TSO, DEC VAX/VMS, or UNIX 4.2 services.

The current version (1.01) has been in distribution for several months. Version 2.0 is in final preparation, and is planned for release in September. Some of Version 2.0's main features include:

- Runs on Macintosh 512K, Macintosh Plus under HFS, and Macintosh XL (not recommended for the Macintosh 128K).
- Supports up to four services (hosts) selectable via dialogs or configuration files (Tincan documents).
- Provides error-free file transfer to and from the remote computer via PCTRANS.
- Offers automatic and semiautomatic log ons using a special-purpose scripting facility.
- Implements almost all features, including key assignments, screen buttons, and communications parameters, as resources that can be modified with custom Resedit templates supplied with Tincan.
- Displays online help for all features, including buttons and dialogs, with a simple Option-click on the item.
- Includes a map showing all key assignments.
- Offers direct cursor positioning using the mouse.
- Features on-screen buttons supporting common functions.
- Implements 36 PF keys as Escape sequences ( the ~ key is mapped to ESC); the 12 keys in each of the top three rows invoke PF1 through PF36 when preceded by ESC.
- Uses Option as a second shift for the PA, cursor, and extended word-processing functions.
- Provides a session capture option with a scrolling window for TTY communications.
- Allows simple file send and receive for TTY sessions.
- Offers quick print for plain ASCII files.
- Supports printing on ImageWriter and LaserWriter printers.

Tincan was developed and written at Yale specifically for Yale students, faculty, and staff. It is sold to non-Yale affiliated individuals for $50 prepaid, including the program (non copy-protected), a user's guide and a set of Tincan documents—sample configuration files set up for the commonly used services at Yale. Site

## Telecommunications

### Tincan: A Terminal Emulator for the Macintosh

licenses are available for $1,000 to educational institutions and for $2,000 to commercial sites. YTERM, a similar program for the IBM PC, also developed at Yale, is available under the same conditions. Note that Tincan site licenses are separate from YTERM site licenses and the purchase of one does **not** entitle the customer to the other. The site license grants copying rights to the manual and disk, and one year's updates, for use by members of the licensing institution. You may purchase it by writing.
Current status: Completed.
**Contact:** Yale Computer Center, 175 Whitney Avenue, P.O. Box 2112, Yale Station, New Haven, CT 06520-2112

## Word Processing

### MacWrite Translator

The translator consists of two programs that allow you to translate a document from MacWrite version 3 (RAM-based) format to that of another word processor.
Current status: Public domain software available now.
**Contact:** DCS, 401 URIS Hall, Cornell University, Ithaca, NY 14853

### GriffinText

GriffinText is a fast, no-frills text processor developed at the Reed College MacLab.
Current status: Available. Consortium price: $39. Retail price: $69.
**Contact:** Prof. Richard Crandall, Reed College, Portland, OR 97202; (503) 771-1112 ext. 277

### LaserWriter Driver for IBM PC Scientific Word Processor

Current status: Unknown.
**Contact:** Neville Smythe, Department of Mathematics, Australian National University

### Indexer for MacWrite

This project allows automatic or interactive indexing/cross referencing /keywording.
Current status: Completed.
**Contact:** Neville Smythe, Department of Mathematics, Australian National University

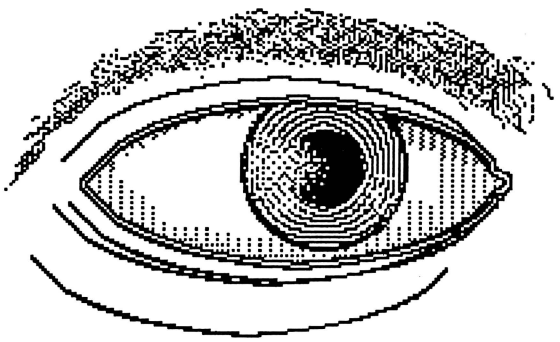
# Word Processing

## Library Word Processing Center

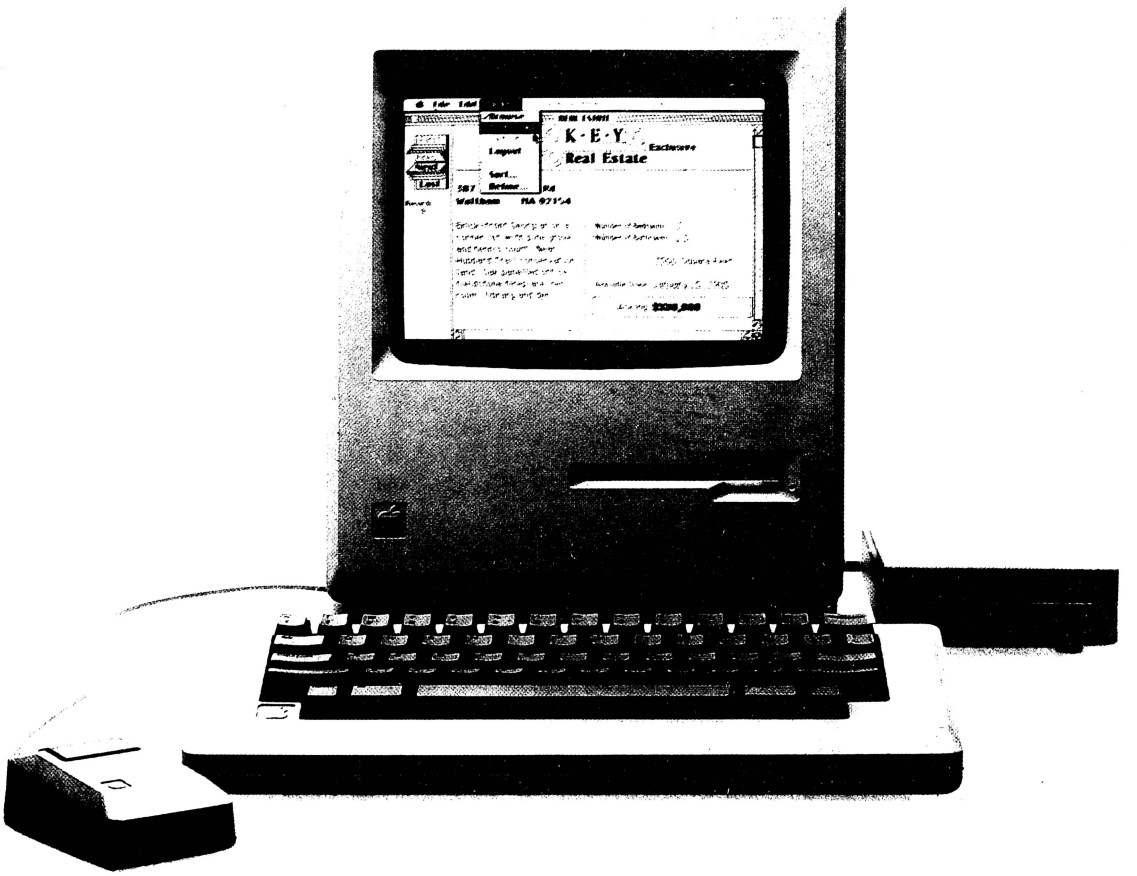
The Harold B. Lee Library at Brigham Young University has a word-processing center that includes (among other things) 10 Macintosh computers and 2 LaserWriter printers. The Macintosh computers are available for $1.50/hr. and the LaserWriters for $3.00/hr. to students and faculty and include word-processing software. They are quite popular: each LaserWriter printer averages 15,000 pages per month!

**Current status**: Completed.

**Contact**: Scott Eldredge, Manager, HBLL Word Processing Center, 3361 HBLL, Brigham Young University, Provo, UT 84604; (801) 378-6723



# We're investing $50,000 in our partnership.




## The 1987 "Wheels for the Mind" Competition.

*Wheels for the Mind* has always served to spread information about the work that faculty, staff, and students in higher education are doing with the Macintosh™ personal computer.

Now, the *Wheels for the Mind* Competition offers a special opportunity for us at Apple to recognize some of the innovators who have worked to make computer use an integral part of higher education.

The competition is open to faculty, staff, and students from all disciplines who have developed academic applications that involve use of Apple® products. Entries will be assessed on how well they advance the innovative use of computers in education.

The judging won't be easy. Based on the work we've seen, the academics and computer scientists (including Apple's Bill Atkinson) on the panel will have their work cut out for them.

The grand-prize winner will receive $20,000, and four runner-ups will get $7,500 each.

More than a contest, the *Wheels for the Mind* Competition is an investment in our partnership with the academic community. We hope that you'll invest by submitting your entry—after all, it just might be worth $20,000. Look for the entry form and official rules in this issue of *Wheels for the Mind.*



Apple and the Apple logo are registered trademarks of Apple Computer, Inc. Macintosh is a trademark of Apple Computer, Inc.

**Save 25% with this introductory offer.**

☐ YES! I want to save 25% on a one-year subscription to *Wheels for the Mind*. I understand that if I sign up now, I'll receive four exciting, information-packed issues for just $12. To help us keep you abreast of current developments in your field, please complete all of the following:

Name _____

Address _____

City _____ State _____ Zip _____

Phone No.

Do you own a computer? ☐ Yes ☐ No

If so, what kind? _____

What is your major field of study? _____

Special areas of interest? _____

What sections of *"Wheels"* do you find most interesting/useful?

☐ Editorial
☐ Work in Progress
☐ Macintosh Computer Products
☐ Dialog Box
☐ Technical/Development

X _____
Signature Date

Send no money now. You will be billed later.

Detach here and mail.

**Save 25% with this introductory offer.**

☐ YES! I want to save 25% on a one-year subscription to *Wheels for the Mind*. I understand that if I sign up now, I'll receive four exciting, information-packed issues for just $12. To help us keep you abreast of current developments in your field, please complete all of the following:

Name _____

Address _____

City _____ State _____ Zip _____

Phone No.

Do you own a computer? ☐ Yes ☐ No

If so, what kind? _____

What is your major field of study? _____

Special areas of interest? _____

What sections of *"Wheels"* do you find most interesting/useful?

☐ Editorial
☐ Work in Progress
☐ Macintosh Computer Products
☐ Dialog Box
☐ Technical/Development

X _____
Signature Date

Send no money now. You will be billed later.

Detach here and mail.

**Save 25% with this introductory offer.**

☐ YES! I want to save 25% on a one-year subscription to *Wheels for the Mind*. I understand that if I sign up now, I'll receive four exciting, information-packed issues for just $12. To help us keep you abreast of current developments in your field, please complete all of the following:

Name _____

Address _____

City _____ State _____ Zip _____

Phone No.

Do you own a computer? ☐ Yes ☐ No

If so, what kind? _____

What is your major field of study? _____

Special areas of interest? _____

What sections of *"Wheels"* do you find most interesting/useful?

☐ Editorial
☐ Work in Progress
☐ Macintosh Computer Products
☐ Dialog Box
☐ Technical/Development

X _____
Signature Date

Send no money now. You will be billed later.

Detach here and mail.

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

**BUSINESS REPLY MAIL**

FIRST CLASS PERMIT NO. 453 CUPERTINO, CA

**APPLE COMPUTER, INC.**
**WHEELS FOR THE MIND 23L**
**P.O. BOX 810**
**CUPERTINO, CA 95015**

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

**BUSINESS REPLY MAIL**

FIRST CLASS PERMIT NO. 453 CUPERTINO, CA

**APPLE COMPUTER, INC.**
**WHEELS FOR THE MIND 23L**
**P.O. BOX 810**
**CUPERTINO, CA 95015**

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

**BUSINESS REPLY MAIL**

FIRST CLASS PERMIT NO. 453 CUPERTINO, CA

**APPLE COMPUTER, INC.**
**WHEELS FOR THE MIND 23L**
**P.O. BOX 810**
**CUPERTINO, CA 95015**

Apple University Consortium
Awards for Excellence In Academic Computing

**1987 Wheels for the Mind Competition**

# Official Submission Form

## Person submitting the entry:

*(An acknowledgement of receipt will be mailed to you.)*
Indicate additional addresses if you cannot be reached between now and December 1986 at the address listed.

*Name* _____
*Address* _____
_____
*Phone(s)* _____
*Organizational affiliation, position* _____

## Nominee:

Indicate which you are nominating (check ONE box):

❑ *Person*
❑ *Group (give address of key person, list names of all)*
❑ *Organizational unit (name of key person, name of unit)*

*Name of key person* _____
*Other names, if applicable* _____
_____
*Address* _____
_____
*Phone(s)* _____
*Organizational affiliation, position* _____

## Project Description:

*Title of Project:*

_____

*Into which category(ies) do you feel the project most closely fits?*

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

*How many terms has the project been used at your institution?*

*How many users have benefited from it?*

Please provide up to two pages of text describing the entry, emphasizing how the project meets the judging criteria. Supporting materials, disks, photos, and so forth, should be attached.

Please list below *all* materials submitted:

All nominations must be sent by November 15, 1986 to Apple Computer at the following address:
*Apple Computer, Inc., 20525 Mariani Ave., MS 23-E, Cupertino, CA 95014; Attn: Beth Ann Moore.*

**$50,000 in awards will be presented, with no single prize to exceed $5,000.**

**I understand that my submission of this entry gives Apple Computer, Inc. the right to demonstrate, display, publicize, promote, or publish information about it, and furthermore, that Apple Computer, Inc. has no responsibility to return anything submitted.**

Date of submission Signature of person submitting

*Apple and the Apple logo are registered trademarks of Apple Computer, Inc. Macintosh is a trademark of McIntosh Laboratory, Inc. and is being used with express permission of its owners.*

**Apple Computer, Inc.**
20525 Mariani Avenue
Cupertino, California 95014
408 996-1010
TLX 171-576

M1516

Apple Macintosh WHEELS FOR THE MIND FALL 1986 Vol.2 No.4